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by B. H. Jarman

SOCIETY FOR ADVANCEMENT

OPERATIONS RESEARCH

What it is:

Operations research is the use of principles and methods of scientific research in solving an operating problem. Its purpose in Management is to give the executive a measureable basis for making an important decision according to the varying sets of conditions that can influence the outcome of one or several possible courses of action.

What it uses:

Operations research functions on a teamwork basis, combining the thinking and scientific methods of the mathematician, the physical scientist and often the social scientist. It engages the combined skills of pertinent academic disciplines and Management experience in producing for the executive the optimum results that he may expect from each of several possible decisions regarding a given problem or combination of problems.

Where it has been used:

Operations research, following its demonstrated success in World War II has been applied successfully to the following management areas: inventory planning and control, plant location, marketing, finance, production planning and control, traffic, budgeting, financial incentives.

SAM OPERATIONS RESEARCH CONFERENCE

January 28-29, Park Sheraton Hotel, New York

PROGRAM

THURSDAY, January 28

9:30 ***Introduction to Operations Research***

The best way to explain operations research is by describing what it has actually accomplished in reducing costs and increasing profits.

What Has Operations Research Accomplished in America?

What Has Operations Research Accomplished in Great Britain?

LUNCHEON

12:30 ***Operations Research in Industry***

The first major applications of Operations Research were to help military operations. This session is devoted to industrial applications of techniques which have proven successful to the military.

2:15 **(1)** ***Accomplishments of Operations Research on Production Problems***

Cases showing how output has been increased and costs have been reduced in major manufacturing plants in this country.

Case Illustrations by three speakers.

(2) ***Accomplishments of Operations Research on Finance Problems***

An area where operations research offers special promise of cutting costs through the use of improved statistical and analytical techniques.

Case Illustrations by three speakers.

(3) ***Operations Research Techniques***

To describe how old techniques have been refined and applied to new situations. Many forms of mathematics used by specialists from various fields have provided contributions to management problems.

Design of Experiments — Waiting Problems
Linear Programming

FRIDAY, January 29

9:30 **(1)** ***Accomplishments of Operations Research on Marketing Problems***

How to forecast consumer behavior will be illustrated by these cases. Buyers, wholesalers and manufacturers can operate more efficiently when supplied scientifically processed information.

Case Illustrations by three speakers.

(2) ***Accomplishments of Operations Research on Inventory Problems***

The problem of optimum inventory levels and how to handle masses of data efficiently are particularly susceptible to solution by operations research.

Case Illustrations by three speakers.

(3) ***Operations Research Techniques***

Techniques supplement an attitude of mind when applied to physical and operating problems in modern business.

Symbolic Logic — Decision Theory
Information Handling

LUNCHEON

12:30 ***Future Applications of Operations Research***

Past applications demonstrate only part of the worth of a technique. Here will be presented new potential applications.

2:15 ***Panel Discussion on: Administration of Operations Research***

REGISTRATIONS

Due to limited conference room accommodations, all registrations must be in advance, and none may be made at the time of conference. Advance registrations will be accepted in the order of receipt.

Registration fee covers all sessions, luncheons, and cocktails: $85.00. Make all checks payable to Society for Advancement of Management, 74 Fifth Ave., New York 11, N. Y. Send: care of C. A. Slocum, Executive Director.

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On Operations Research

IT HAS been said that this country, which worships success, was largely built by its failures—by enterprises that dared to pioneer but, for one reason or another, failed.

While the country may have benefited, those immediately concerned were adversely affected; and businesses are begun and operated primarily for the benefit of those involved in them.

What is the vital difference that makes a business successful?

Invariably it is sound management, from the very beginning. A unique ability to find the right answers and to make the right decisions at the right time.

In today's complex economy, the answers to be found are so many that the average executive, or executive committee, finds the days almost too short for all that must be done or attended to.

It is no wonder that management today is looking at "operations research" as the mathematical eye which will take much of the guesswork out of management decisions. "Operations research" brings the cold eye of mathematics, physics, statistics, accounting, psychology and other management sciences to bear on industrial and social operations.

Industry and business have in many ways been using these various management sciences for many years to reduce the unknowns that are involved in many management decisions. However, it took the military services in World War II to see some of the results that were possible from an "operations research" team of specialists. By these methods, for instance, the Navy was able to distribute with optimum effectiveness its search vessels over a large area of ocean believed to be infested with submarines.

Since the War, such problems as quality control, production planning and scheduling, inventory control, budgeting and sales distribution have been tackled separately and as combined inter-relationship by means of the concepts of "operation research." A sales manager can determine the influence that price, number of salesmen and other sales factors will have upon a company's volume. A wholesaler can learn how best to distribute merchandise among several warehouses so as to serve the greatest number of retailers most efficiently. A company president can determine the best balance of purchasing, manufacturing, sales and distribution and distribution factors to yield maximum profits.

In attacking a problem the researchers consider all aspects of the operation and all the variables that bear on the outcome of the operation. Numerous observations are made, such as what path a customer takes through a store, or what shopping days are heaviest. Certain factors that can be measured and expressed mathematically are determined. From these the operations researchers find how to put equipment and men to work with the greatest effect.

The method of hunting submarines has come to be called the theory of search. Since the War researchers have been seeking ways to apply this theory of search to such business problems as advertising and merchandising.

Operations research has been and will long continue to be important to successful management. Therefore, the Society for Advancement of Management is bringing together at a conference on January 28 and 29, 1954, in New York City, a group of recognized experts to present the methods and results of operations research. It is the objective of the Society that those attending will have an opportunity to appraise and discuss operations research with respect to their own problems in industry and business.

BRUCE PAYNE, PRESIDENT, SAM

Can Executives be Taught To Think?

by B. H. Jarman

Good thinking is the most important single process in civilization. It is also the most carelessly evaluated. It should be an absolute art for today's business executive. But how many management men do you know who lean on intuition? How many wait for hunches? How many feel a situation? How many repeat time-tested logic, and go no further? Here is a diamond-bright, gem-hard analysis of various types of thinking, their value, the reasons for their existence, when to use them, how to learn at last whether or not you are one of the rare genuine good thinkers or not, and finally a list of several ways you can check on your own thinking as a means of improving it

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INTERNATIONAL Business Machines Corporation has made THINK signs as universal in office furnishings as waste baskets, ash trays, and paper weights. Do THINK signs really make administrators think through the power of suggestion, or do they serve to advertise IBM products, or are they merely decorative? Can executives be taught to think? If so, how?

If the answer is a negative one, executives cannot be taught how to think, (and many leaders conclude that they cannot) then the American people are facing a far greater crisis than is commonly supposed, inasmuch as we are challenging an enemy whose quantitative numbers and potential resources are greater than ours. The only possible hope of vanquishing the foe is through qualitative means: (1) unity of plan and execution, (2) individuals with superior formal education and technical training, and (3) leaders who are both capable and willing to think. Thinking, then, is not an academic problem about which it is interesting to speculate; thinking, on the contrary, constitutes the most promising road to victory.

We are surrounded on every hand with evidence of both good and bad examples of thinking, sometimes going on simultaneously under the same roof. A duPont executive, whose company has been made conspicuously successful as a result of good thinking, reminds us that, "The number and cost of undiscovered $10,000 mistakes made in our company as a result of faulty thinking are more staggering than anyone would wish to contemplate."

Differences Between Thinking And Non-thinking

What is the essential difference between the thinker and non-thinker? "The thinker," one dictionary says, "is one who uses his mind in the exercise of judgment and inference." The non-thinker, on the other hand, makes his decisions on the basis of habitual behavior and attitudes based on emotional states.

Rodin's famous statue "The Thinker" is very appealing to the romantic. It recalls in stone an early ancestor in deep meditation sitting immobile with head in hand. We like to believe that such early progenitors out of sheer thought created such contributions as fire, better housing, tools, domesticated animals, and superior weapons. Similarly, in our day, we picture the thinker as a man who walks alone, removed from both men and worldly affairs. We conceive the thinker as an early riser, preparing himself at dawn with mental gymnastics, as he faces a day devoted to thinking. Alas for sentimental fancies. Thinking is hard work that is seldom spectacular and oftentimes completely unappreciated. Thinking never takes place in a vacuum, but begins with a problem so frustrating that it must be solved.

Because thinking and learning are interrelated, so inseparably integrated, let us review briefly some of the more pertinent facts that we know about learning.

First, both the effective learner and thinker are highly intelligent. Perhaps we can define intelligence best by saying that intelligence is the ability to learn quickly, the ability to solve problems readily, and the ability to adjust to new situations. One cannot improve on his own intelligence because it is an hereditary gift from his parents and grandparents. One can exploit his intelligence, however, to the maximum degree by good utilization of his social and physical environment.

Second, most educational psychologists agree than human beings learn primarily in three ways: (1) trial and error, (2) conditioning, and (3) by in-

sight. Children learn mostly by trial and error and by being conditioned. Perhaps you can still remember when you learned to your sorrow that the tabby cat would scratch you when you pulled her tail, and that the hot radiator would burn you when you touched it with your bare hand. Similarly, your mother conditioned you to enjoy eating green olives, to admire fair play, and to respect your superiors. Learning how to solve a difficult algebra problem, however, was a different matter. Trial and error and conditioning were of little help here. Perhaps one night you went to bed utterly stumped, but as you brushed your teeth the next morning the answer to your problem suddenly flashed in your mind crystal clear. This flash of mind is known as insight. Most worthwhile thinking cannot be solved on the level of stimulus—response, or simple logical reasoning, or by geometric demonstration. Such thinking embraces the concept of insight.

Third, learning is dependent on (1) the relative perfection of the senses and (2) the general tone or condition of the organism. Inasmuch as most of our learning results from the senses of eye and ear we are interested in visual and auditory acuity, and in visual and hearing defects. Such factors as age, strain and fatigue, temperature, light, time of day, and use of drugs play a part in individual learning.

Fourth, study and research have resulted in the so-called laws of learning, the major ones being: (1) readiness, (2) exercise, (3) effect, and (4) association. Briefly, we know that learning is most effective when the individual is ready to learn; that repetition and use keep learning alive in the mind; that we like to learn those things that give us satisfaction and tend to avoid those things that frustrate us; and that the recall of a given item learned in conjunction with another item serves to recall the other.

Mechanics of Learning are Revealed Through Research

Fifth, experience and research in learning have taught us much about the methodology of learning including (1) how to read for both speed and comprehension, (2) how to study for both mastery and retention, (3) the correct length and intervals of practice periods, (4) the effect of cramming, (5) whole-versus-part methods in the memorization of materials, and (6) motivation of the learner in terms of knowledge of progress, praise versus blame, and rewards versus punishments.

There are literally hundreds of business concerns today that are pioneering in the field of teaching their executives to think. Although there are many types of programs teaching leaders to think, they all fall into one of two categories, indirect and direct methods. The indirect methods range from sending executives to school, improved reading programs, psychological testing and counseling, and job rotation.

General Foods and International Harvester are two examples of companies using direct methods in teaching their leadership to think, the former relying on the step-by-step problem — solving conference technique, and the latter on courses in logical thinking. Regardless of which approach we use, the direct or indirect, a knowledge of learning—its motivation, methodology, and measurement is helpful.

Analysis of Three Main Levels of Thinking

Just as there are said to be at least three managerial levels of administration, there may also be different levels of thinking. President William F. Bramstedt of the Texas Oil Company, Limited, relegates executive leadership to three levels: those recalling and studying the past are comptrollers; those regarding and controlling the present are plant managers; while those who study and plan for the future are presidents and vice presidents. On both the comptroller and managerial levels all the facts are given, but on the presidential level only some of the facts are given. I believe that an analogy can be made here between management and thinking levels.

As in management, I believe that there are three main levels of thinking: (1) the habit level, (2) the problem—solving level, and (3) the insight or creative level. Habit and problem—solving thinking are logical because all the facts are given. Thinking on the insight level, on the other hand, is non-logical in nature because only *some* of the facts are given. Making sound conclusions and judgments when important data are either unknown or not given is truly creative thinking. Let us now turn our attention to an analysis of the three levels of thinking, beginning with the habit level.

The habit level of thinking results from both trial and error and conditioning learning. In a very real sense it is not thinking at all in the best meaning of that much abused word. We have all seen the unimaginative coach whose offensive team kicked, ran, and passed in a definite pattern. Everyone in the stadium, including the opposing team knew what to expect. The only element of surprise was how long the kick, how far the pass, and whether the man with the ball hit the center of the line or ran around end. Similarly, we all recall the executive whose "thinking" resulted in a given answer. The tabloid mind and habit level of thinking go hand-in-hand.

Many routine situations, of course, justify the habit level of thinking if for no other reason than to save time and energy. The danger of relying too heavily on this thinking level, however, is that little or no effort may be given to evaluation and improvement. Improvement in thinking as with all things, results in continuous evaluation.

Perhaps William J. Reilly is his *The Twelve Rules for Straight Thinking* and John Dewey's *How We Think* give us to date the best accounts of logical thinking, using problem-solving techniques. It is interesting to note the two authors' similarity of steps in problem-solving. The steps in problem-solving for Reilly are as follows: (1) Observe and analyze the facts by asking what, when, where, whom, (2) Define the problem, (3) Examine all possible solutions, (4) Choose the best solution on the basis of evidence for and against each solution considered.

Dewey Gives Five Important Steps in Thinking

Dewey's steps in thinking number five: (1) a felt difficulty, (2) its location and definition, (3) suggestions of possible solutions, (4) development by reasoning of the bearings of the suggestions, and (5) further observation and experiment, leading to its acceptance or rejection.

The problem-solving level of thinking may be illustrated in the stalling and starting of an automobile. We all have had the experience of trying to start a stalled engine. Step one began with a feeling of frustration and annoyance because our car would not start. In short, we were confronted with a problem.

Step two consisted of an analysis of all possible explanations as to why the car would not start, including fuel, loose wires, dead battery, bad spark plugs, broken fuel pump, and flooded engine.

Step three began in checking the most obvious causes as to why the automobile would not start and continuing to the

next most obvious in a descending hierarchy until the right solution was reached.

The intelligent thinker takes an additional step. Step four consists of generalization and evaluation. In solving the problem just illustrated, he asks himself this question: If a similar problem were to face me in the future, what have I learned in this experience that would help me in the new situation?

No New Problem is Entirely New

Problem-solving always begins with a problem situation and should end with solution and evaluation of the experience. In a very real sense none of us is faced with an entirely new problem. The new problem, fortunately, has identical elements in common with old problems already solved. Problem-solving, therefore, is what Dewey referred to as learning by the reconstruction of experience, solving new problems in terms of old.

Thinking of a non-logical nature, is a complex configuration involving memory, experience, technical knowledge, people, and judgment. As with problem-solving it begins with the ability to recognize, understand, and comprehend the problem. Psychologist Eliot Hutchinson lists four stages leading up to the "flash of insight" in creative thinking. According to Hutchinson, these stages are: (1) Preparation including definition of the problem and search for a solution, (2) Frustration so great that the problem may be temporarily abandoned, (3) Moment of insight usually while engaged in some minor task such as walking, (4) Verification by applying critical judgment to the insight.

It is interesting to note that in both problem-solving and in insight thinking that there is an interplay between inductive (going from the known to the unknown) and deductive (going from the general to the particular) methods. In fact, it would be difficult to illustrate thinking where either the inductive or deductive method was used alone. A classic example of creative thinking that illustrates the double nature of the thinking process is the story of Trudeau, the pioneer of a cure for tuberculosis.

Trudeau became a victim of the dreaded disease, tuberculosis, in his day America's number one killer. One can well appreciate Trudeau's problem, that of personal survival.

Trudeau searched everywhere for a cure. Physicians advised him to sleep in a closed bedroom inasmuch as drafts and night air were held to be harmful. He next turned his attention to any literature that might offer some bearing on his problem. His readings taught him (1) that tuberculosis was a civilized disease virtually unknown to primitive people who lived out-of-doors, and (2) that the hearty native Scottish cattle in the Highland country were not afflicted with the dreaded disease. From experience as camper and hunter, Trudeau remembered feeling better when living in the open while residing in the Adirondacks.

Trudeau next turned to scientific research. Koch had isolated the T.B. germ in 1882, thus making possible Trudeau's experiment. Trudeau secured fifteen rabbits, dividing them into three groups of five rabbits. Group One rabbits were inoculated with pure cultures and placed under the best conditions of light, food, and air. Group Two rabbits were inoculated likewise but placed under the worst possible conditions of food and housing. Group Three rabbits were not inoculated but were also placed under very bad conditions. What were the results?

Four of the Group One rabbits recovered (inoculated but had ideal living conditions). Four Group Two rabbits died (inoculated but lived under the worst living conditions). Although none of the Group Three rabbits died all were in weakened physical condition (not inoculated and living under the worst living conditions).

Creative Thinking Involves Unknown Factors

We may summarize Trudeau's creative thinking by listing the following steps: (1) awareness of a problem, (2) gathering all possible data, both firsthand and secondary, that seemed pertinent to his problem, (3) dissatisfaction with the current opinion that nothing could be done to cure tuberculosis, (4) the flash of insight that tuberculosis could be cured providing a proper environment could be created for the victims, and (5) insight verified by experimentation with three groups of animals.

Creative thinking is made difficult because all the facts are not known. It is interesting to note that Trudeau began with a partial picture and as knowledge about his problem grew the configuration became clearer. The great moment, of course, was the flash of insight that told him that tuberculosis could be cured providing the victim's environment could be controlled. Verification of the insight by experimentation was almost routine.

Good thinking cannot be separated from actual situations because problems are part of everyday work. Some businesses are so poorly organized, or with leadership so bad, that good thinking is impossible. Management can be so organized, however, under sound leadership that good thinking is both encouraged and expedited. Good management, it seems to me, makes use of three factors: (1) its aims are clearly understood and agreed upon by all; (2) its organizational chart at all levels clearly defines duties, functions, and responsibilities; and (3) it makes the best possible utilization of its personnel in carrying out its plans.

Individual Personality is Major Consideration

Good thinking, likewise, cannot be separated from people. Research and experience have taught us much about adults—how they learn, how they are taught most effectively, how they are motivated, and how to get them to be team players. We must keep the following facts in mind if we would work effectively with adults:

1. Adults work best when they feel respected as individuals. They like to work with you, not for you.

2. Adults work best when they feel important members of a team. No one wants to sit on the bench.

3. Adults work best when they have some voice in planning and organization. Success or failure then becomes a personal matter in which the individual must accept his share of the responsibility.

4. Adults work best when they receive psychic as well as real income. Psychic income results from feeling that the job is important; the individual is respected; he has a voice; and he is playing on a great team.

5. After age forty most adults decline in learning capacity from one-half to one percent each year thereafter. There is also a slow decline in audio-visual acuity and reaction-time. Experience, however, may more than compensate for the loss of organic power to learn and act.

Most good thinking is the result of both individual and group inter-action. Individual thinking will count for naught unless the person doing the thinking can work well with other people. Few important decisions are entirely the result of one person's thinking. For

this reason, therefore, it is not enough to think well; it is also necessary for you to be able to express your thinking so that other people can understand it. In short, you must sell yourself before you can sell your ideas.

The best example of group thinking, in my opinion, is found in Harvard University's advanced management courses, where the aim is to clarify the thinking of leaders through the study of case histories of industrial problems. Each student is expected to work through his own understanding of a given case. When he comes to class his point of view and understanding come into sharp conflict with those held by his fellow students. The role of the discussion leader, the professor, is not to decide the one correct answer, but rather to see that all ideas are presented. The effect of mind on mind cannot be overcalculated in thinking.

Group thinking has certain advantages over individual thinking. Among these advantages are:

1. Group thinking makes use of contributions by everyone.
2. Group thinking serves oftentimes to modify individual thinking.
3. Group thinking serves to stimulate individual thinking.
4. Because group thinking makes use of more minds, additional experiences and ideas are presented.
5. Because group thinking leads to collective action, it is oftentimes more effective than individual thinking.
6. Group thinking constitutes one example of the effectiveness of democracy in action, the free enterprise of ideas.

Group thinking situations also serve to point out poor thinking. Poor thinkers may be classified into five main groups:

1. The psychic, or inspired, thinker. He would rather wait for a "hunch" than use his mind to solve problems.
2. The wishful thinker. He wants a given conclusion and uses his heart instead of his mind.
3. The half-baked thinker. He does not utilize suspended judgment, but goes off half-cocked, giving his answer when only part of the data is considered.
4. The closed-mind thinker. He is close kin to the wishful thinker, but regards himself as the realist and hard-headed person. "We have always solved our problems in this way and I see no reason to change," he reasons.
5. The ego-centric thinker. His self-admiration blinds him to the fact that other people can also think.

We may summarize the characteristics of good thinking as follows:

1. Good thinking is characterized by the desire to think better, mind set.
2. Good thinking recognizes the total situation in which the problem takes place especially in terms of people and situation immediately concerned.
3. Good thinking begins with the recognition and understanding of the problem under consideration.
4. Good thinking is research. It gathers all available data, primary and secondary, that may throw light on the problem in hand.
5. Good thinking makes use of human resources as well as physical things.
6. Good thinking is characterized by insight, and by willingness to make hypotheses as to possible solutions.
7. Good thinking is willingness to test the most probable hypothesis first and continue down a descending scale of theoretical solutions.
8. Good thinking maintains an attitude of suspended judgment until all facts have been weighed and tested.
9. Good thinking is verified by conclusions. Good thinking is functional and objective.
10. Good thinking evaluates each step in the problem just solved in order that future problems of a similar nature may be solved more easily.

Just as we have attempted above to summarize the ten characteristics of good thinking, we will list below an equal number of suggestions that make for better thinking:

1. Improved thinking begins with the desire to think more effectively. The closed mind is the greatest single drawback to good thinking. Despise mediocrity of thinking in both yourself and your colleagues.
2. Good thinking is done only by intelligent people. If executives are expected to learn how to think, one criterion for their selection should be their ability to learn.
3. The good thinker has a flexible mind. Many potential thinkers are handicapped owing to laziness, fixed habits, and satisfaction with the status quo.
4. The good thinker is a hard worker. Thinking involves a complicated process including the location of the difficulty, collecting all possible pertinent data, the reasoning analysis of facts and inferences, shrewd deductions of the most promising solutions until the right one presents itself, suspended judgment, and continuous evaluation.
5. The good thinker is self-disciplined. He sublimates emotions in favor of reason. Anger, love, fear, and hate add color to our lives but are serious detractions to good thinking.
6. Thinking is integrated with both situations and people. The effective thinker must know (1) how to think, (2) the situation in which the problem takes place, and (3) the people who are concerned in the problem situation.
7. Good thinking oftentimes takes courage. It is not always easy to come up with an answer that is unacceptable to the group albeit it is the correct answer.
8. Good thinking and humility go hand-in-hand. No one human mind can know everything. Good thinking is more often than not the result of good group procedures. Two heads are better than one even if one is a cabbage head.
9. The good thinker knows when to use the three types of thinking. He uses the problem-solving type in logical situations where all the facts are present. He uses insight in non-logical situations where some of the facts are unknown.
10. We must either learn to think or perish. Thinking is not ivory tower, academic, and something we can either take or reject. We can and must learn to think better both individually and collectively.

If I had the power to leave only three basic impressions that would be indelibly written in your memory with respect to thinking these would be: (1) improved thinking on your part is based on a *desire* to think better; (2) improved thinking, in order to be effective, must include situations and people; and (3) improved thinking means continuous learning and hard work. END

Thinking: Basis of the Renaissance

It was only about 500 years ago that Europe began to rate the power of thinking, and especially creative thinking, on a par with the power of brute force. It was this new attitude that gave vitality to the Renaissance.

—Alex F. Osborn, Applied Imagination.

Fatigue—Measuring and Reducing It

by Lucien Brouha

This article is the substance of a paper originally delivered by Dr. Brouha before the SAM Eighth Annual Time Study and Methods Conference in the spring of 1953. The appearance of the article in the published Proceedings of that conference stimulated such widespread interest that the editors of AM feel it deserves the attention of a larger management readership. In it, the author carefully analyzes the problems of fatigue: what it is, what causes it, how it can be measured, and what can be done to reduce it. Such a study is of vital importance to the management effort to integrate the promotion of individual welfare in the drive toward team efficiency

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FATIGUE is a vague and general term which is applied to many different situations, produced by many factors and characterized by many symptoms. We know that physiological, psychological and sociological influences are involved in the production of fatigue but, from a scientific point of view, there is no single precise definition of fatigue. Physical fatigue, mental fatigue and nervous fatigue are terms used by physicians, physiologists and psychologists and the common factor which characterizes all these states is a tendency towards inactivity. Fatigue has been described as a sort of "negative appetite for activity".[1] We may add that the "negative appetite" is usually more pronounced for the specific kind of activity that has produced fatigue and it may not exist for other kinds of activities.

Regardless of the type of fatigue considered, it can not be accurately evaluated unless changes occur that can be accurately measured and that can be reproduced within reasonable limits under similar conditions. So far, numerous kinds of fatigue have escaped precise investigation because no reliable means exist for measuring them. So called *nervous fatigue* is a good example of this case. Other kinds of fatigue such as *mental fatigue* have been evaluated more or less successfully by various testing programs which require strictly controlled experimental conditions and cannot be applied in routine industrial practice.

Numerous attempts have been made to use the variations in daily work output as an index of variations in fatigue as in the well known experience of the Western Electric Company. One cannot escape the general conclusion that the degree of motivation rather than the degree of fatigue is estimated by that method. Fortunately, the type of fatigue produced by muscular exertion and by adverse environmental conditions can be evaluated by various methods.

Numerous experiments have been performed to determine the physiological effects of muscular work of varying degrees of intensity. It is known that when shifting from a resting condition to one of physical activity many physiological functions change from their *resting level* to a *working level.* Heart rate, blood pressure, cardiac output, pulmonary ventilation, oxygen consumption, chemical composition of the blood and urine, body temperature and rate of sweating are all modified by muscular activity. By measuring one or more of these variables during activity it is possible to determine by how much the working level differs from the resting level. This gives an estimate of the degree of physiological stress experienced in performing a given task and leads to an estimate of the degree of fatigue to be expected from that task. After activity is over it is possible to follow the return of these variables to the resting level and to determine the duration of the recovery period at the end of which the individual is back to the preactivity physiological equilibrium.

The working level varies according to the work load, to the environment in which the work is done and to the physi-

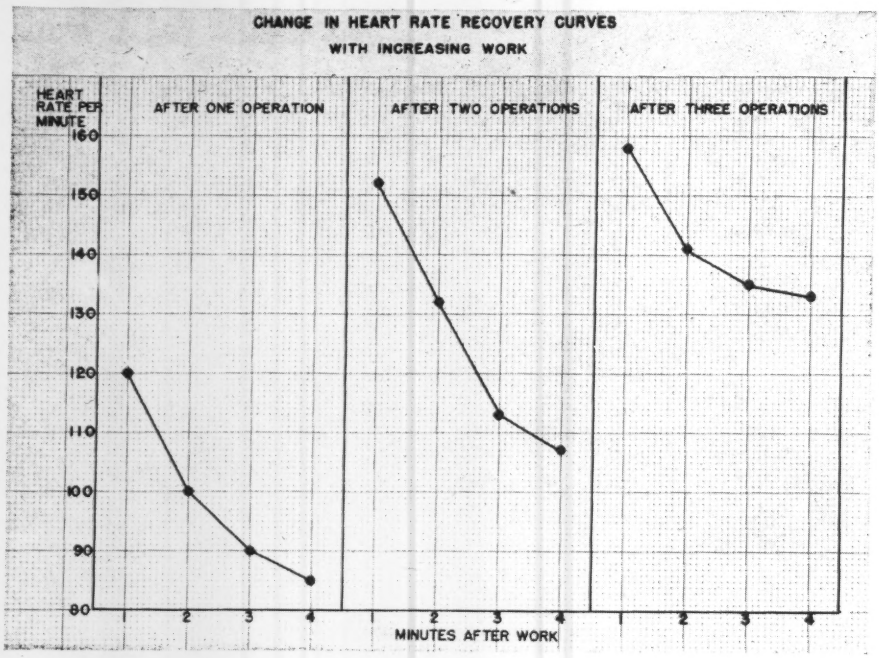


Fig. 1

cal capacity of the individual. The rate of recovery to the resting state varies also according to these various factors and it is proportional to the stress experienced during work. Consequently, by measuring the physiological stress and the time it takes to recover from it, situations leading to physical fatigue can be evaluated.

This is only a small part of the general problem of fatigue in industry. Nevertheless, considering that in a great number of jobs muscular exertion is still the main factor of fatigue, it is well worth investigating that problem. It has been demonstrated that practical improvements leading to increased work output and increased employee well being can result from such studies, but one has to remember the limitations of the method and avoid conclusions that go beyond the facts.

The Problem of Measuring Physiological Stress

Muscular activity results in changes in heart rate,[2] oxygen consumption,[3 4] pulmonary ventilation,[5] lactic acid concentration in the blood,[6 7 8] body temperature,[9] 17-Ketosteroid excretion in the urine,[10] eosinophil count in the blood[11] and in the reaction forces produced by bodily motion.[12]

These changes are proportional to the degree of stress but some cannot be used to evaluate fatigue in industry because the stress is not great enough. For example, little or no increase of lactic acid is found in the blood of workers in the great majority of industrial jobs. Other methods, even though accurate, are not applicable because they require complicated apparatus which is too cumbersome to use at the site of the job.

Recorded Changes in Pulse Rate Give Measurement

During muscular activity comparable to that found in industrial jobs, a linear correlation exists between the amount of work performed and the changes in heart rate, total pulmonary ventilation and oxygen consumption.[3 4 5] These measurements are comparatively easy to make in the laboratory but in industrial practice recording ventilation and oxygen consumption is usually found to be impractical.

Since numerous measurements must be collected to compensate for individual variations as well as for daily variations in the same individual,[13] a simple technique is essential if the method is to be used routinely. Recording changes in pulse rate satisfies the above criterion and has been found to give satisfactory measurements of the physiological expenditure that is required by a given job. Fortunately, following the pulse rate variations after the job is done, when the subject is recovering from a work cycle, usually gives sufficient information.

The principle of the method used in this research was developed in the Harvard Fatigue Laboratory.[14] It consists of counting the pulse rate at one minute intervals during the first three minutes of the recovery period after the termination of work and while the subject is sitting quietly. From these pulse rates a "heart rate recovery curve" can be constructed which indicates the actual values of the pulse and the rate of recovery toward resting level. Two conclusions can be derived from these measurements. Firstly, for a given individual or for a given group of workers, the heavier the physiological load the higher the heart rate and the more slowly it returns to its resting level. Secondly, the better the physical condition of the individual, the smaller the increase in heart rate for a standard work load and the more rapid the return of the heart rate to its resting value. Thus, both the physiological stress and the physical aptitude of an individual for a specific job can be determined from the recovery pulse rate measurements.[15 16] This is the basis of the "Harvard Step Test"[17] which was widely used during World War II for assessing the physical fitness of armed forces personnel.

In addition to measuring the cardiovascular stress by counting pulse rate, medical thermometers are used to record the changes in oral temperature. It is known that body temperature increases in relation to the work load and the duration of work. Body temperature must be known in order to estimate the stress imposed upon the thermo regulating mechanisms, particularly when physical exertion is combined with heat exposure. The reading is usually taken at the end of the fourth minute following work.

Measuring pulse rate and body temperature is technically simple. The equipment required, stopwatches and accurate medical thermometers, is inexpensive and easy to handle and the duration of one observation is, at the most, only four minutes.

Heart Rate Recovery is Key To Fatigue Measurement

The onset of fatigue can be predicted from heart rate recovery curves. When no satisfactory recovery can take place between a series of successive operations the first pulse rate after work becomes progressively higher and the heart rate remains at a high level for a progressively longer time during the recovery period. The return toward the resting level is very slow and definitely points to the existence of "physiological fa-

tigue" in these workers. Figure 1 illustrates this situation.

Jobs Classified According to Physiological Stress

The same method is used to analyze the physiological influence of the various parts of a given job consisting of several operations. Such an analysis indicates what part of a job is the hardest and what should be modified or eliminated in order to reduce the overall stress. It becomes, therefore, possible to classify jobs according to their physiological stress.

It is clear that the work load is an important factor in determining the fatigue level. Heat is an added stress. Experiments in the laboratory as well as industrial surveys reveal the same phenomenon: the warmer the environment above 40° F., the harder the job. It is known that the human machine works best when it can maintain its temperature at about 98.6° F. Muscular work produces heat and the more work the more heat which has to be dissipated to maintain normal body temperature.

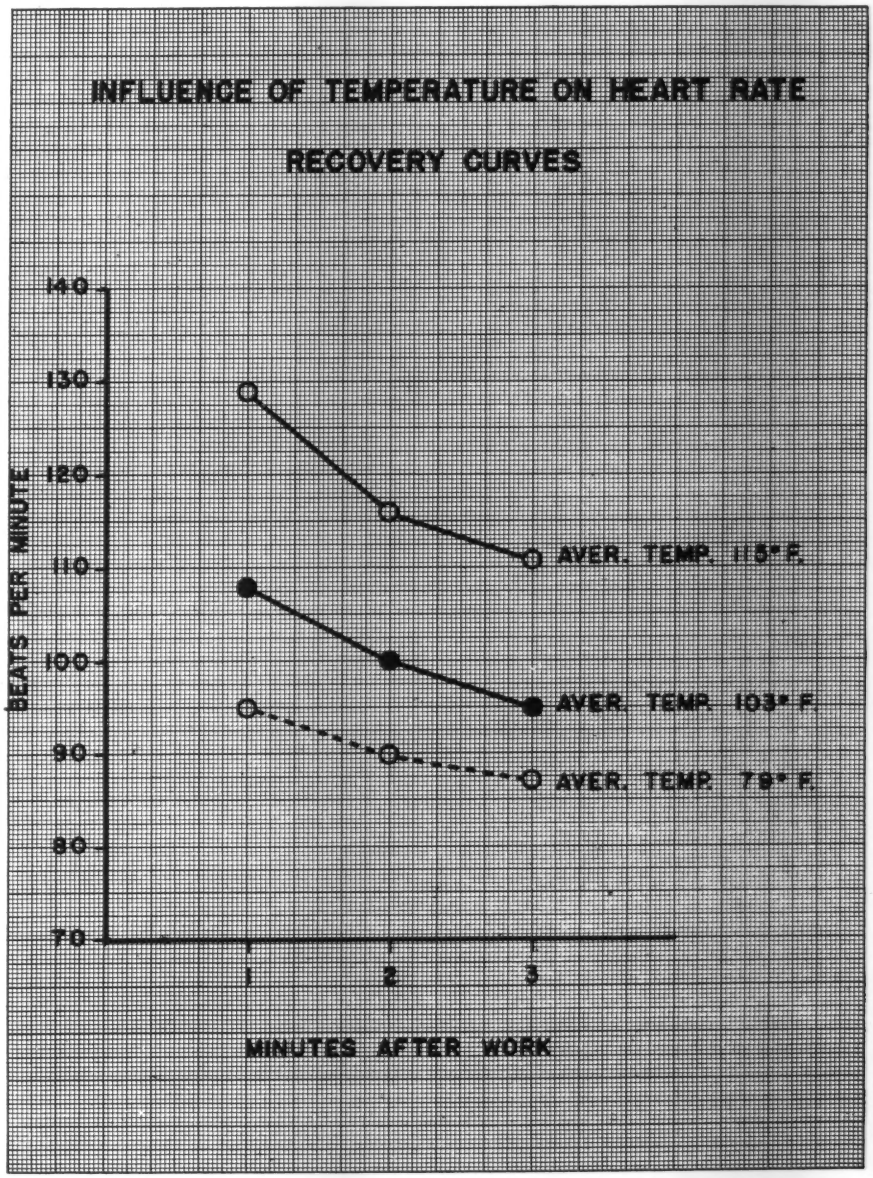
When the surrounding temperature is below that of the body a certain amount of heat is lost by conduction, convection and radiation and the remaining part is lost by evaporation of sweat and exhalation of water vapor. The body temperature remains constant when these various processes compensate for the heat produced by the normal metabolism and by muscular exertion. If the surrounding temperature becomes greater than that of the body, heat is gained by conduction, convection and radiation and the only means that remain to dissipate heat is through evaporative cooling. In order to do so the rate of sweating increases and through vasodilation of the skin a greater amount of blood can reach the surface of the body and lose its heat. For the same amount of work the heart rate becomes progressively higher as the temperature increases, the load on the cardiovascular system becomes heavier, fatigue appears sooner and exhaustion is reached faster. Figure 2 shows the heart rate recovery curves obtained for the same job performed at various temperatures.

The amount of heat that can be lost due to the evaporation of perspiration depends on the air temperature, the humidity and the air movement. When humidity increases, evaporative cooling decreases rapidly thus reducing the ability of the body to dissipate heat. Under these conditions high heart rates, high body temperatures and very slow recovery after work result in pronounced fatigue. Figure 3 illustrates the change in heart rate before, during and after a standard amount of work at various temperatures and humidity. For the higher range of temperature and humidity the recovery from work was incomplete and remained so for as long as thirty minutes after the end of work. Complete recovery is impossible when the surrounding atmosphere is too warm and too humid and fatigue appears rapidly under such conditions.

A good example of the ill effects of high temperature and humidity is given when impervious clothing, worn as a matter of protection against chemicals, interferes with the dissipation of body heat. The layer of air trapped inside the suit warms up to body temperature and becomes saturated with moisture thus creating adverse environmental conditions. The elimination of cooling the body by evaporation produces a rapid and marked increase of the physiological stress and leads steadily towards a state of complete exhaustion with high heart rates and high body temperatures. (Figure 4).

Sex, age, the state of nutrition and exposure to certain chemicals are also factors influencing the fatigue level and their action can be measured by changes

Fig. 2



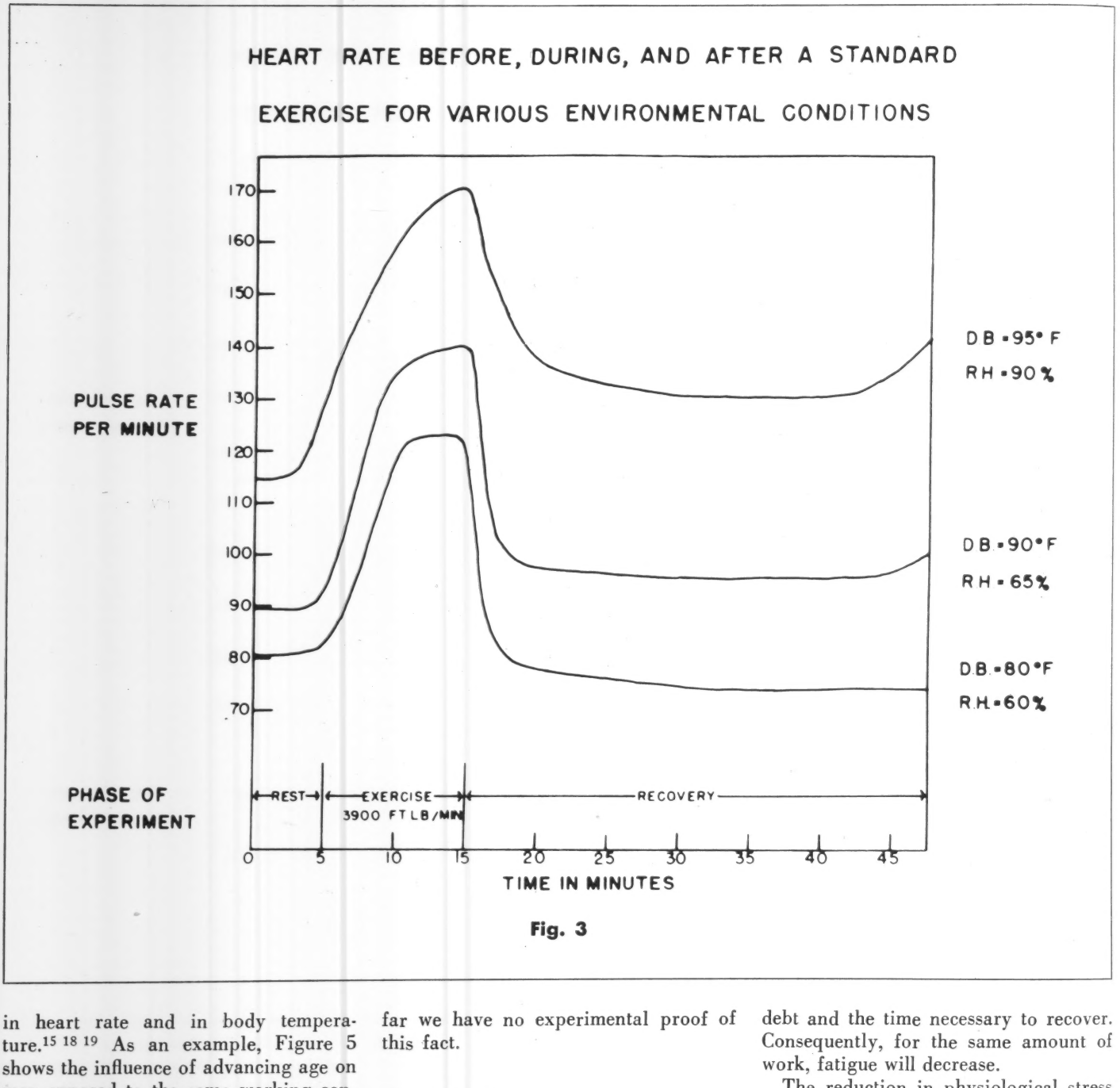


Fig. 3

in heart rate and in body temperature.[15 18 19] As an example, Figure 5 shows the influence of advancing age on men exposed to the same working conditions. There is no doubt that, for a standard work load, the stress is greater and fatigue appears sooner in the older workers. The same is even more true when heat is added as a factor of stress.

It can be concluded that by establishing the heart rate recovery curves and by measuring the changes in body temperature after work it is possible to determine the influence of many of the factors contributing to industrial fatigue.

Other physical factors, however, have not been investigated in plants because of the difficulty of realizing satisfactory experimental conditions. Dust, noise, vibration, smoke and fumes may be important contributors to fatigue but so far we have no experimental proof of this fact.

Effective Methods for Reducing Fatigue

In order to summarize simply what has been discussed, the following comparison can be made. Each worker owns a "physiological capital" which enables him to have a certain "physiological credit". As he works, he contracts a "physiological debt" which varies with the nature of the job. After the work is over, the greater the debt the longer it will take to pay it back and to recover fully to the physiological resting level. Therefore, any change in the job or in the environment that will reduce the physiological stress will also reduce the debt and the time necessary to recover. Consequently, for the same amount of work, fatigue will decrease.

The reduction in physiological stress can be evaluated by the lowering of heart rates and body temperatures and by the disappearance of high reactions towards the end of the day. The aim is to organize the work so that at the end of the shift the reactions should be the same or only slightly higher than they were at the beginning of the day's work.

Some examples of reducing the stress and of evaluating the physiological benefit of the change will now be presented.

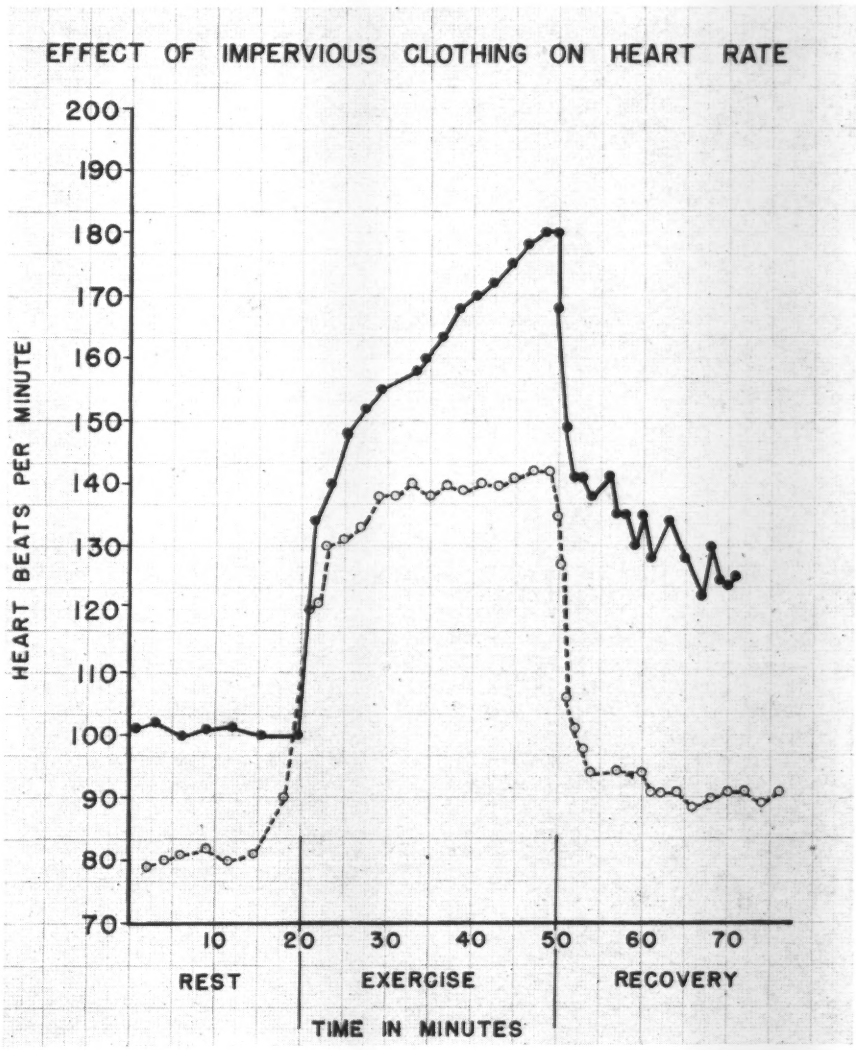
• **Reducing the Work Load.** Any body motion is the consequence of the contraction of at least two groups of muscles: some of which produce the action and the others which control it by antagonist contraction. The final re-

sults can be expressed as "mechanical work" in terms of foot pounds. It should be realized that, so far, no relation has been established between the mechanical work done and the energy spent by the body to maintain its balance and to accomplish the various motions necessary to produce the mechanical work. In terms of the human machine, what counts is not the mechanical work but the "physiological work" which is necessary to perform a certain movement and which sooner or later will produce fatigue. Nature, speed and rhythm of motion influence the physiological cost according to the number of muscles involved and to the rate of contraction. In many instances additional muscles have to contract statically in order to maintain certain segments of the body in a set position so that a given movement can be accomplished. The static contraction of these muscles, which has no direct relation to the mechanical work, is nevertheless costly from the physiological point of view. A simple example of this fact is given by the much more severe fatigue experienced while painting a ceiling with numerous muscles statically contracted than while painting a floor when little static contraction is needed.

Many industrial operations can be made easier if the position of the body (static contraction), the nature of motion (dynamic contraction) and the speed of motion (rate of contraction) are so arranged that the work load is decreased and the physiological cost of the job is reduced to a minimum level. This can be achieved by combining time, motion and physiological studies.

For any job in which the physiological expenditure is great enough to produce significant changes in heart rate, the heart rate recovery curves will determine the physiological cost of the job and will permit evaluation of any modification that is made in attempting to reduce stress and fatigue. For example, in a job where men had to skim impurities from the surface of a liquid with a long and heavy ladle, the tanks were situated at such a height above the floor that the operation had to be performed at shoulder level. Average reactions were high, reaching 160 beats per minute for the first pulse recorded one minute after skimming one tank. Special platforms were built so that the men could operate slightly above waist level. The average heart rate recorded one minute after the operation dropped to 112 beats per minute indicating a drastic reduction in the "physiological work" necessary to perform the job.

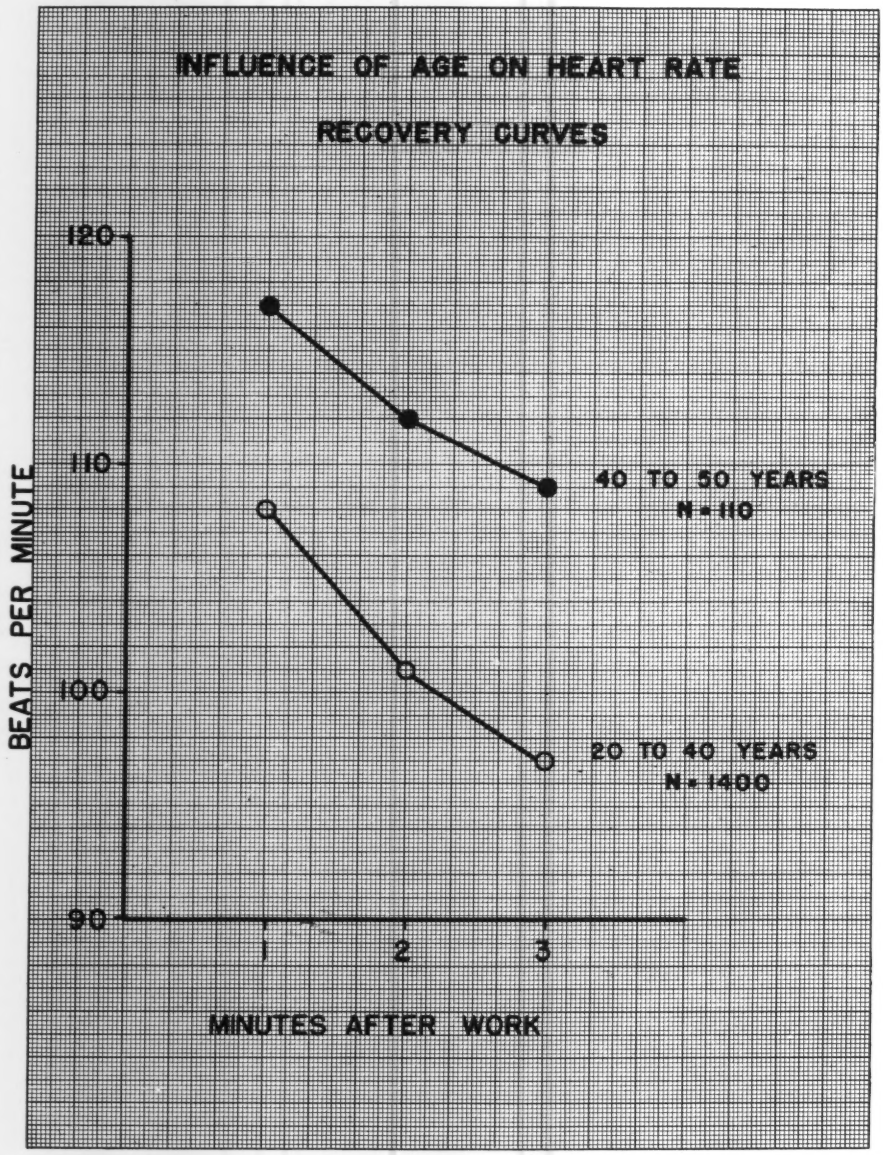
Fig. 4



When the work load is not great enough to produce significant changes in heart rate, a method has been devised recently which analyzes, by means of piezo-electric quartz, the apparent changes of weight produced at the center of gravity of the subject by various motions involved in a given job.[12] Each time the changes of weight can be minimized the physiological cost of the motion is reduced as indicated by a lower consumption of oxygen. This method has given precise analysis of various movements but its use in industrial practice is limited because of complicated and costly equipment.

In addition to improving motion and timing, an industrial operation involving hard manual labor can often be totally or partially mechanized and consequently the physiological stress is reduced. By developing some mechanical device, a very fatiguing operation can be transformed into a comparatively easy one. Figure 6 illustrates the change in the heart rate recovery curves observed in the same environmental temperature on men doing a job entirely by hand or partially mechanized. In this case the mechanical device eliminated lifting and using a comparatively heavy hammer above shoulder level. Before this improvement a high physiological stress was put upon the workers as indicated by an average recovery pulse of 148 beats per minute measured one minute after the end of a work period. With the new method the average value fell to 110 beats per minute demonstrating that the partial mechanization had resulted in a marked diminution of the

Fig. 5



stress.

• **Reducing the Heat Load.** Considering the effect of increasing environmental temperature on the physiological reactions, it is obvious that reducing the temperature at which the work is done will proportionately lower the reactions. This can be achieved by an adequate ventilation system, by properly insulating the sources of heat, by protecting the workers with screens or special clothing and by developing tools and methods which will enable the man to work as far as possible from the source of heat.

When humidity enters the picture, adequate ventilation and sufficient air movement will considerably improve the situation. Figure 7 shows the effect of reducing temperature and humidity and increasing air movement on the heart rate recovery curves recorded throughout the shift. At the same time the average body temperature was reduced from 99.3° F. to 98.6° F. Therefore, maintaining temperature and humidity as low as ventilation cost permits, reduces considerably the physiological stress upon the cardiovascular system and the thermo regulating mechanisms of the workers. The final result is less fatigue and greater efficiency.

• **Organizing Adequate Rest Periods.** In many instances, particularly in "hot industries", even when mechanization is advanced and temperature has been reasonably controlled, high reactions are still observed among the workers. In such cases adequately organized rest periods provide a reduction of the physiological stress. When the job is scheduled in such a way that the workers take, at set intervals, a rest period which is of long enough duration to insure a complete or nearly complete recovery, they will be able to avoid excessive fatigue and to remain in good physical condition throughout the shift.

Establishing adequate rest periods is not an easy task. It has to be done patiently, by the method of trial and error and with the close collaboration of the physiologist and the industrial engineer so that changes in rate of work and in production can be evaluated together with changes in physiological reactions. Figure 8 illustrates the problem. It shows that at an average temperature of about 40° F. with short rest periods between successive operations in the morning and with longer rest periods during the afternoon, the workers were able to perform eleven full cycles of work without showing abnormally high reactions. When the same groups of workers were studied in an area where the average environmental temperature was around 82° F., the number of operations was reduced from eleven to eight giving the men longer rest periods. Nevertheless, very high physiological reactions were observed during the second part of the shift indicating a progressive accumulation of fatigue. This shows clearly that at low temperatures the sequence "work-rest periods" was adequately determined to insure high efficiency with a low fatigue level.

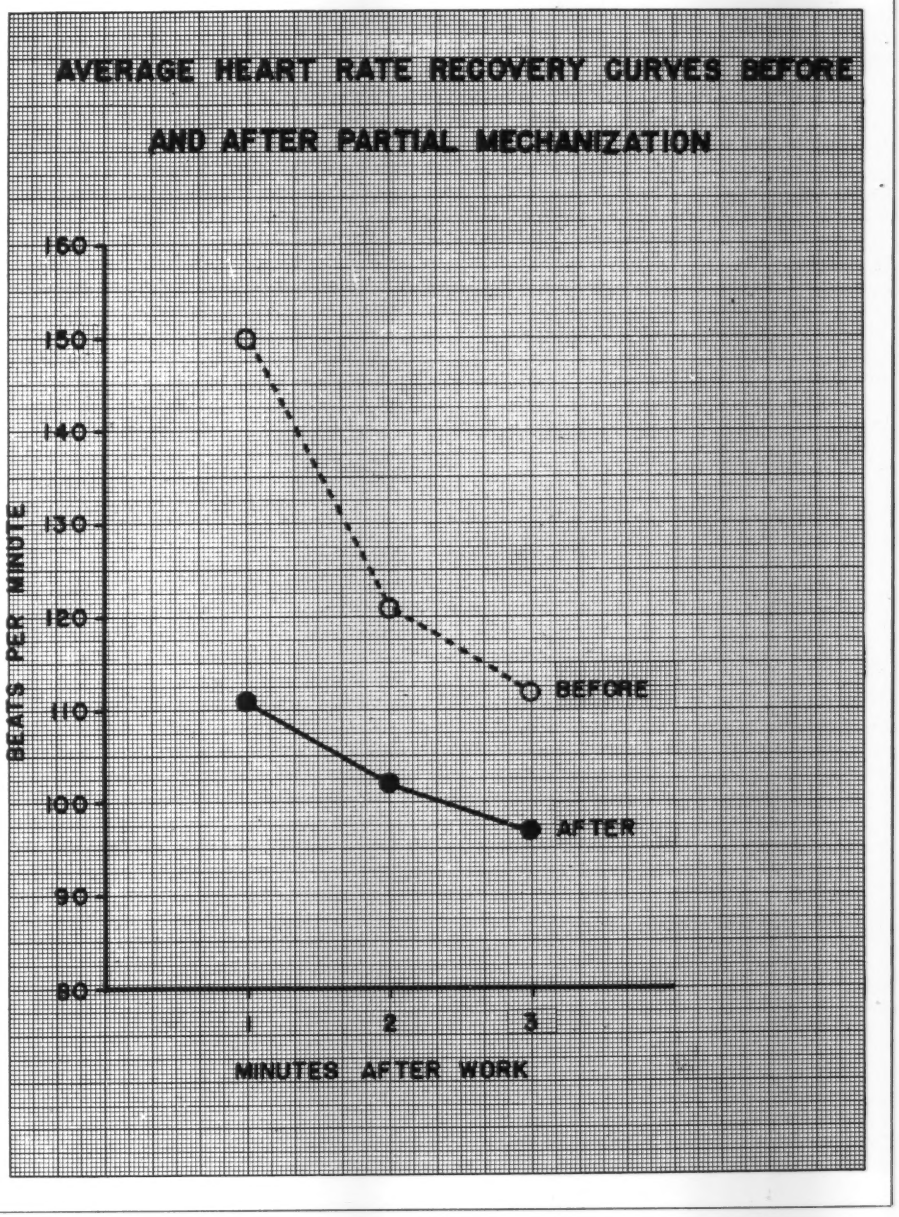
At higher temperatures this system did not work. In spite of a considerable reduction in the total work load and in spite of a considerable increase in the rest allowances, physiological reactions were at a high level. The stress became greater as the shift progressed and the men reached a state of extreme fatigue at the end of the day. In this case, in order to maintain both the physiological reactions and efficiency at an acceptable level, another solution had to be found which was to increase substantially air movement in that particular area. Here again the combination of time study and physiological study lead to a satisfactory organization of the day's work.

Duration of rest periods as the shift progresses and as the environmental temperature changes as well as the time intervals between successive rest periods must be accurately determined if a maximum of beneficial results is to be achieved. When an adequate solution is found the reduction of the physiological

stress is evident as shown by the lowering of the heart rate and of the body temperature throughout the shift.[20] In relation to this problem it must be remembered that complete recovery is impossible for men who rest in a hot surrounding. (See Figure 3, Section B.) In certain instances it has been found necessary to air condition the rest rooms in order to insure environmental conditions favorable to a complete and fast recovery of the workers. Such rest rooms have been installed and used for several years in various plants of the Aluminum Company of Canada. The results have been very favorable as illustrated in Figure 9 which compares the heart rate recovery curves obtained during the summer on two groups of men doing the same job in the same environmental conditions. One group who took their rest periods in the plant or outside in the shade show definitely higher reactions both at rest and after work than the men who could rest in an air conditioned room and could recover to approximately their normal resting level. The temperature maintained in these rest rooms varies with the plant temperature but the humidity is kept at a constantly low level so that the clothing of the men, wet with sweat, dries quickly and makes the workers more comfortable, insuring at the same time a good evaporative cooling and a complete return of body temperatures to normal levels. Figure 10 shows the average body temperature curves obtained under these two conditions.

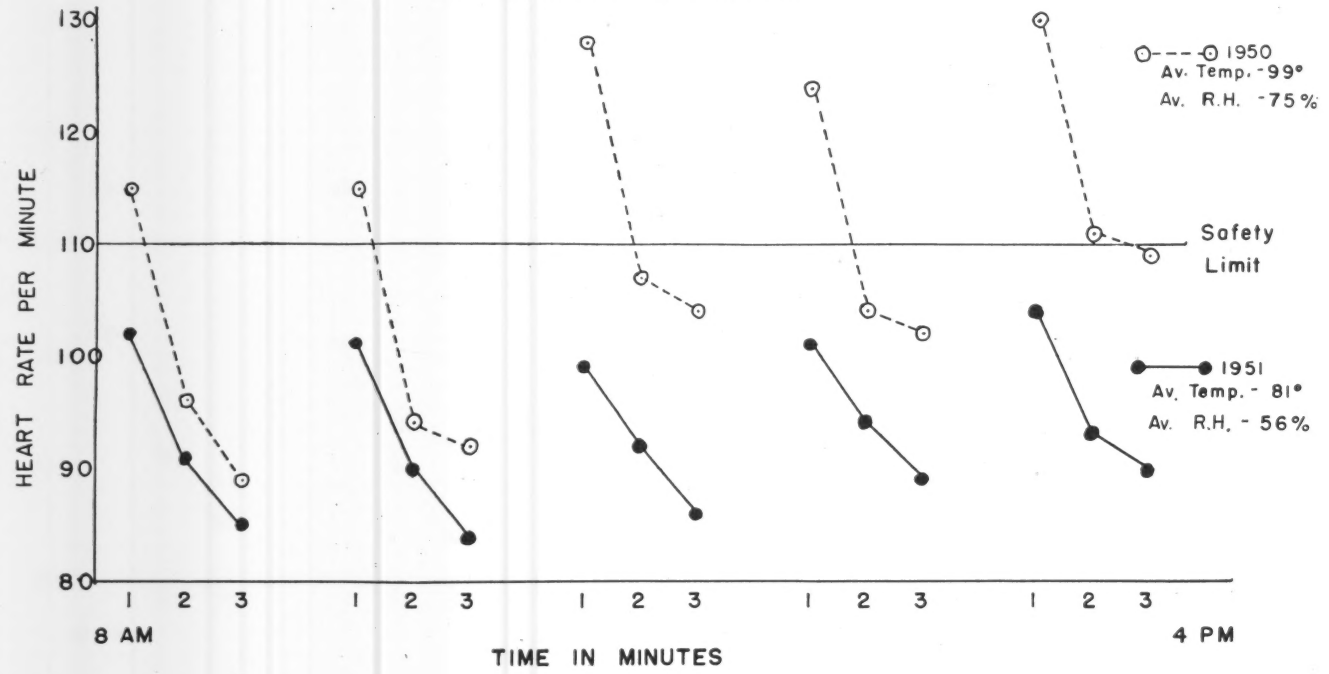
• **Organizing Adequate Teams of Workers.** In certain operations where several men are involved, it is sometimes found that, in spite of various improvements, the physiological stress remains too high when the working team comprises the smallest number of men compatible with the job. Under these conditions the only way to bring down the reactions of the workers is to add men to the team. This decreases the individual physical exertion and increases the resting time. Figure 11 gives the average heart rate recovery curves obtained in a job when crews of three and four men were used. In addition to having a much higher pulse rate, the three man crew also had a higher average body temperature of 99.6° F. as compared to 99.0° F. for the four man crew. The addition of an extra man reduced the physiological stress on the cardiovascular system as well as on the thermo regulating mechanisms. When comparing the reactions recorded on a comparatively cooler day with the environmental temperature averaging 98° F. with those obtained on a warmer day averaging 115° F., it is seen that the greater the physiological stress produced by the job and the environment, the greater the improvement achieved by the addition of an extra worker.

Fig. 6



• **Influence of Adequate Water and Salt Supply.** The importance of an adequate water supply for workers involved in manual labor in hot surroundings has been emphasized repeatedly. In heavy jobs twelve quarts of water or more can be lost through sweating during eight hours of work. In order to avoid excessive fatigue this loss of water must be compensated for as the shift progresses. Drinking must be frequent and sufficient in order to maintain the water metabolism at a normal level on an hourly basis.[21] If the water intake is insufficient, efficiency is reduced and exhaustion soon appears. In practice, drinking will be adequate if an abundant supply of cool, clean and palatable water is available. This is shown in Figure 12 which compares the frequency distribution curves of body temperatures recorded for the same job in the same environmental conditions with and without a good water supply. When the supply was inadequate the water temperature was around 70° F. and the drinking was insufficient to replace the water loss as proved by marked weight reduction in the workers at the end of the shift. High heart rates and body temperatures of 100° F. and above were frequent.

Fig. 7



With an adequate supply of water maintained at a temperature of 42° F. to 45° F. the drinking became more abundant, water metabolism was more efficiently maintained and body temperatures of 100° F. and more disappeared. At the same time the heart rate recovery curves stabilized at a definitely lower level indicating that the total physiological stress had been appreciably reduced.

Keeping a balance between fluid intake and fluid loss is a matter of training because most people who are sweating profusely will drink about two-thirds of what they eliminate on an hourly basis. If the water balance is to be maintained throughout an eight hour shift one has to drink more than necessary to merely quench his thirst. We have had good results by giving the workers paper cups and explaining to them that in order to replace the amount of sweat lost they should drink an average of so many cups at the end of each work period. The number of cups was experimentally determined by studying the average weight loss of the workers involved in various jobs. The men learned rapidly how to force their water intake in order to compensate more accurately for their sweat loss and a definite improvement in physiological reactions was observed.

In these experiments salt tablets were not used and the salt loss was compensated for by adding enough salt to the food at every meal. It has been shown that the concentration of sodium chloride eliminated in the sweat increases as

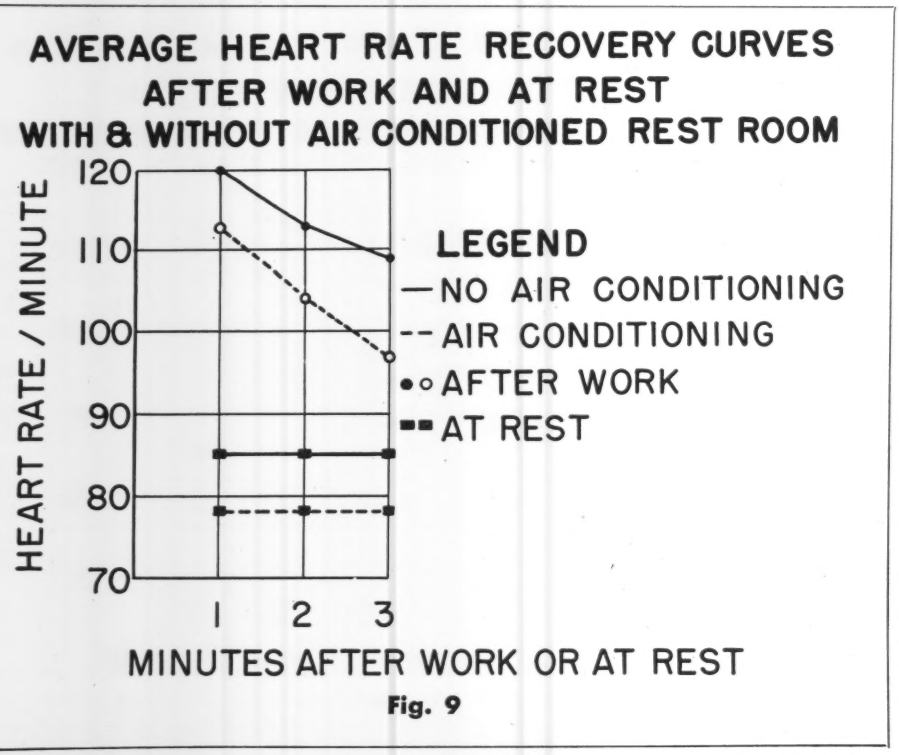
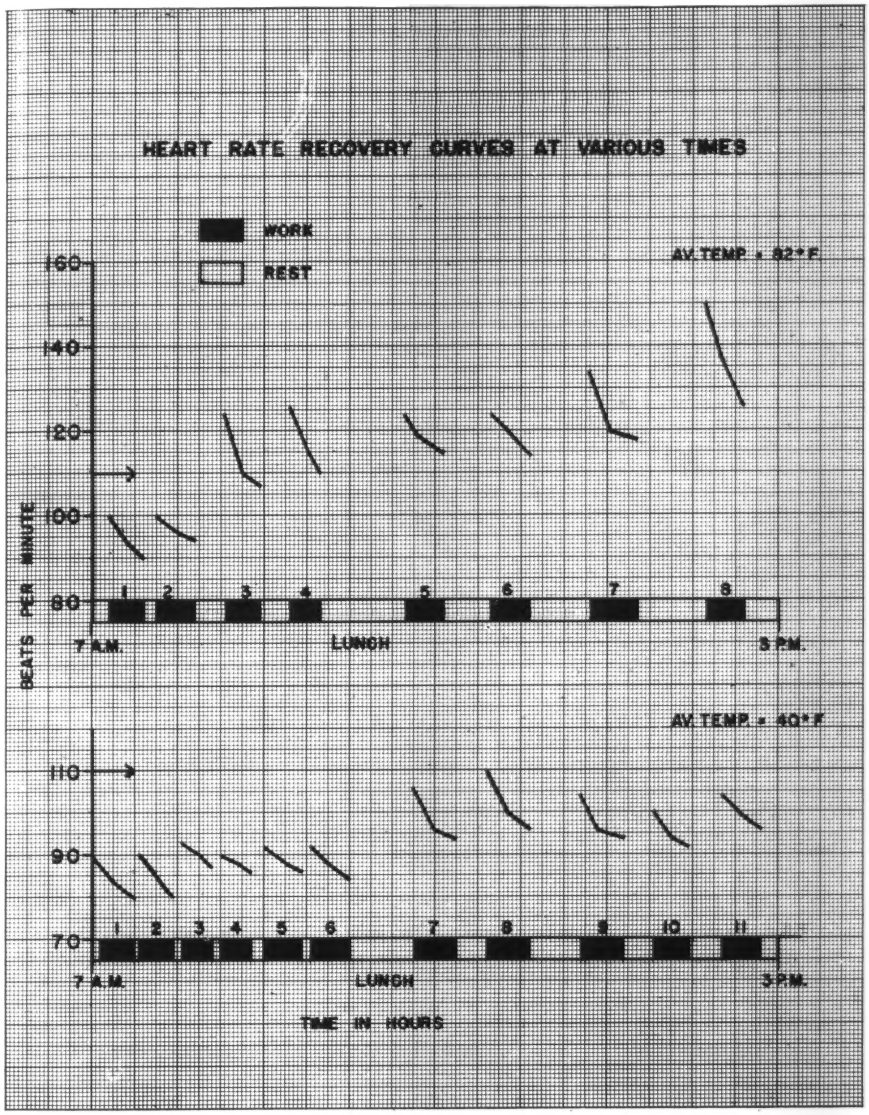


Fig. 9

Fig. 8

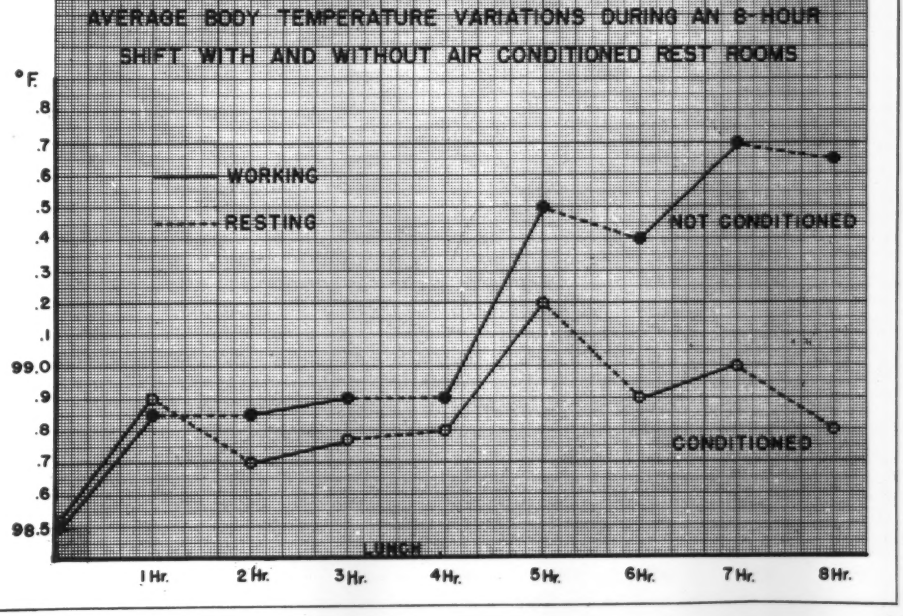


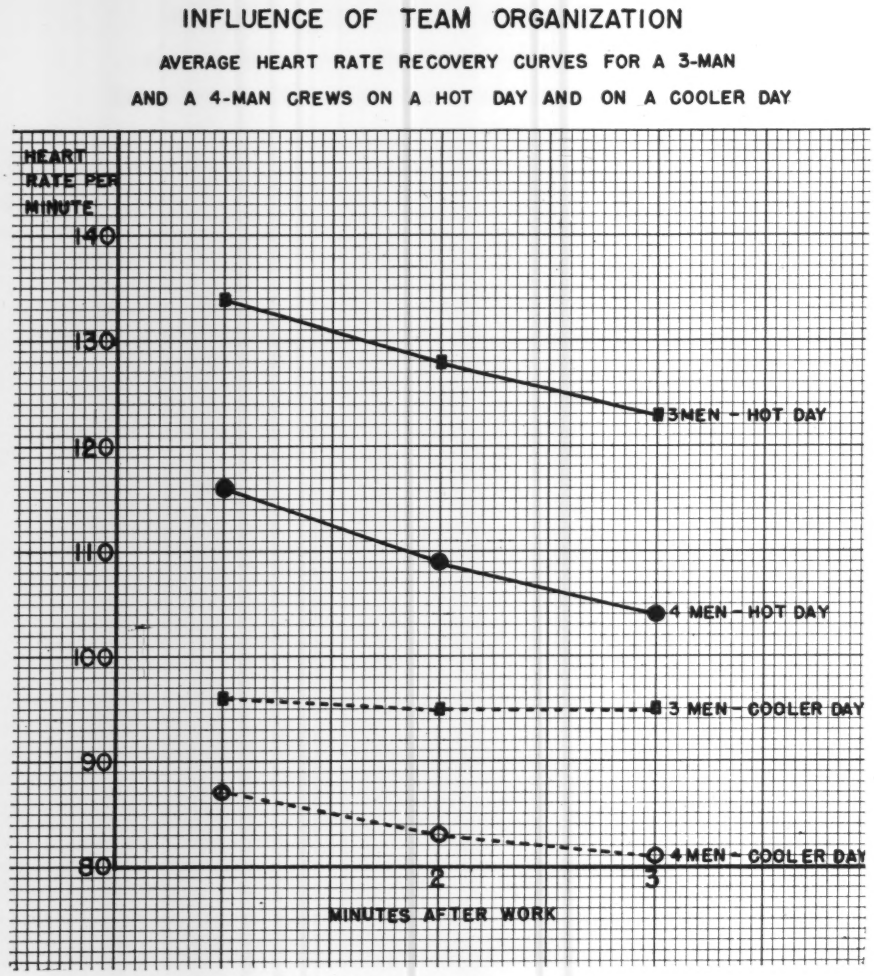
work is prolonged and as the rate of sweating becomes greater.[21] When a progressive depletion of salt occurs fatigue soon appears and in extreme cases, total exhaustion and heat cramps are observed. Nevertheless, laboratory experiments have shown that the sodium chloride level in blood serum remains remarkably constant in prolonged work in heat provided the overall daily intake of salt with the meals is adequate.[22] Our experience with industrial workers eating a good diet confirms these findings. The men were instructed to salt their food abundantly and no extra source of salt in the form of salt tablets or salted drinks was provided. This practice eliminated completely the gastro-intestinal uneasiness, the stomach cramps and the vomiting which were frequently observed when salt tablets were used. Under the usual circumstances of exposure to industrial labor and heat, it is advantageous to replace the sweat loss on an hourly basis and to replace the sodium chloride simply by salting adequately the daily meals. As proved in many instances, the final results of adequate water and salt intake is to maintain the efficiency and the well being of the workers in spite of very abundant sweating, thus decreasing physiological stress and fatigue.

• **Selection of Workers.** The capacity to perform muscular work depends on the natural physical fitness of an individual and on his degree of training for the specific activity in which he is involved.[23] Even when studying men who appear to be thoroughly adapted to their work and to the environmental conditions in which the job is done, wide differences are found among individuals.

The frequency distribution curves of pulse rate and body temperature demonstrate that in order to accomplish the same task some workers experience a much greater physiological stress than others. The upper values of the distribution curves indicate that these men are comparatively "paying too much" for the job and they should be given an easier kind of work. When the "physically unfit" for a given job are eliminated, the remaining group will have a higher efficiency at a lower physiological cost. In many instances the elimination of the poorly fit will have a beneficial effect on the morale of the group because one must remember that a man who is fatigued by his job blames the

Fig. 10





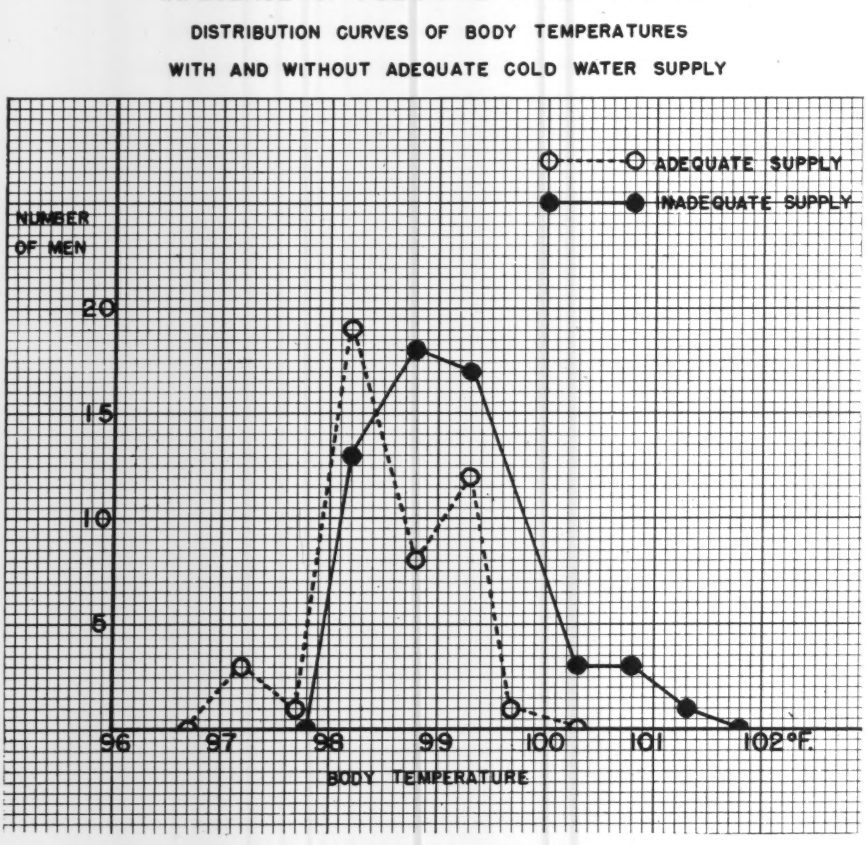


Figure 11, left
Figure 12, below

job rather than himself and influences the attitude of his coworkers. From all points of view it is important to transfer these workers and to use, for comparatively hard jobs, men who can handle them easily.

So far it is only by studying the physiological reactions produced by the job that the qualifications of an individual can be determined. For example, selection of heat resistant workers and a system of gradual adaptation has been used successfully at the City Deep Mine in South Africa.[24] In an experimental chamber equipped with rocks and shovels the new workers are given probationary tests in atmospheres comparable to those encountered in underground work. "Heat intolerant" individuals are detected by excessive increase in pulse rate and body temperature and given no employment in hot jobs. "Heat tolerant" subjects are gradually adapted to their future task in periods of four to fourteen days according to individual tolerance.

Such methods take time and have to be handled with great care in order to avoid antagonizing the workers. Nevertheless, considering the cost of frequent turnover and of continually training new men, and considering the ill effects of chronic fatigue and dissatisfaction among the workers, the experience is well worth trying in industries where physical exertion and exposure to heat are combined to give a predominant importance to the physiological capacities of the workers.

From the general point of view of labor utilization the lower the physiological stress required by a given task the more people will have the capacities to qualify for it. Therefore, the recruitment of new personnel will be simplified and the employees will be able to continue working at a satisfactory level of efficiency in spite of advancing age. It is obvious that it is in the interest of both management and the workers to see that, by the combined efforts of the industrial engineer and the physiologist, the stress and fatigue produced by the day's work be reduced to a reasonable level.

It has been our experience over the last eight years that when the average value of the first recovery pulse is maintained at about 110 beats per minute or below no abnormal fatigue is observed as the day progresses. It appears that

this level of work can be maintained throughout the shift in a "physiological steady state" provided work and rest periods are adequately organized. The recovery is complete and the physiological measurements taken at rest at the end of the day are within normal limits.

The unmeasurable factors which cause stress and fatigue in industry, such as emotional stimuli, boredom, social adjustments, etc., are certainly more numerous than those which can be measured. In spite of our ignorance of the quantitative importance of these imponderables, certain physical factors which lead to fatigue have been measured and their importance evaluated. As a result we know that industrial fatigue can be reduced.

Firstly, the environmental conditions can be improved to the best possible level. Secondly, machines and tools can be designed for maximum efficiency with minimum physiological stress. Thirdly, the workers can be chosen on the basis of their physiological fitness for a given job and their work can be organized to produce minimal fatigue. The accomplishment of these objectives requires the collaboration of the physiologist, the engineer, management and labor.

Such a cooperative endeavor has been carried on for the last eight years by the Aluminum Company of Canada. It has resulted in improving the working conditions in numerous jobs, thus reducing fatigue and creating higher efficiency and morale in the plants.

It is still true that for many humans, "In the sweat of your brow you shall earn your food". But sweat can be controlled and stress maintained within healthy and safe physiological limits—"Blood and Tears" should be eliminated from modern industry. END

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Supervising The Employee's Health; Like Servicing The Finest Machine

Just as a machine is subject to the supervision of the maintenance crew, after it is put in operation, just so an employee, once he has started to work, comes under your supervision for health maintenance.

It is taken for granted that a man whose duty it is to maintain or repair a machine knows what he is doing. In other words, he must have adequate training. . . .

A mechanic who tries to repair a machine with the wrong tools will not only fail to repair it, but may break it further. . . . Using wrong tools may also fail miserably in health counseling. Wrong tools are: indifference, disgust, impatience, annoyance, anger, criticism, betraying confidences, misuse of force and so on.

No one expects anything from a machine which is not in keeping with its specifications. If we operate or make demands on a machine, which are not in keeping with its specifications, something is sure to go wrong. An industrialist sometimes makes demands on his employees which are beyond their capacity, usually because he has not taken the pains to find out an employee's capacity, or limitations.

When a machine fails to meet the demands made upon it, the foreman does not say the machine is vicious or insubordinate or lazy or disloyal. He does not fire the machine nor discipline it. He orders it taken apart to see why it doesn't work properly. The machine is repaired by the maintenance crew and put back into working order as soon as possible.

Why don't we treat men who break down in much the same way? . . .

We know, but we forget, that men, just like machines, often have no control over the things that happen to them, which prevent them from being as good men on the job as we would like them to be, and as good men on the job as they themselves would like to be and could be.

No, our human nature is peculiar in that we reason fairly reasonably about things—tools, equipment and materials—but do not reason so reasonably about people.—*W. E. Park, Master Mechanics in Human Maintenance, ADVANCED MANAGEMENT, December 1952, pp. 16-17.*

Scientific Management of the Distribution Process

by Harold F. Smiddy

The scientific management movement in the United States has almost reached its Golden Anniversary dating from Taylor's classic Shop Management paper in 1903. This article gives a succinct review of the movement from its conception relating through its growth to the processes of distribution. The author emphasizes the debt that today's scientific management owes to the famous figures of the past, restating in many cases their ability to foresee some of the problems considered to be present day developments. From this point the writer continues, showing how the problems of today's distribution are solved through relationship with the classic statements of scientific management's past

THE scientific management movement in the United States is practically at its golden anniversary point if we date it from Taylor's classic 1903 paper on *Shop Management;* and is fast approaching that milestone even if we date it only from the formation of the Efficiency Society in 1911 or the "Society to Promote the Science of Management" in 1912. The latter was renamed the Taylor Society on his death three years later; and by merger in 1936 with the Society of Industrial Engineers, which had been started some twenty years before, became the SAM as we know it today.

Among the Organizing Committee of the original Efficiency Society in 1911 there were not only numerous outstanding industrialists of that day but also leaders of such distinctly distribution and merchandising companies as William Filene's Sons Co. in Boston, R. H. Macy & Co. in New York and Abraham & Straus in Brooklyn. It is equally notable that among the primary papers at the first meeting of that society on March 18, 1912, paper number seven by Walter H. Cottingham, President of the Sherwin-Williams Company was on "The Sales Department."

Mr. Henry R. Towne, a pioneer of better management whose published writings in the field go back at least to the 1886 *Proceedings* of the American Society of Mechanical Engineers, acted as Chairman of that historic meeting and in commenting on Paper No. 7 said that:

"Mr. Cottingham is not only a salesman, but an organizer, and as such is able in his own factories to so develop the various departments that they balance each other."

In turn, Mr. Cottingham himself made a few remarks that offer as good a text today as they did for his audience at that time; for example:

"The way to get business is to go after it. To go after it is the work of the sales department, and if properly organized and efficiently managed, it will get it.

"Selling is the great thing in almost every business. Getting rid of the product in volume at a profit is the object, and at the same time the test of a successful businessman or a successful business organization. The world in which we live is a great market place, and all the people in it are traders: buyers and sellers in the market place. The strife of competition is among the sellers, and the captains of industry are always master traders and master salesmen. . . .

"It is easier to get men to make goods than to get men to sell them. . . . The head of the house ought to be a salesman. The head of the county ought to be a salesman, with his eyes on the markets of the world at home and abroad; for successful selling means successful leadership. . . .

"The great factor in selling is the human factor, and not the things we sell. The things must be right, of course; but it's people who buy and use the things, and therefore it's people whom we must interest and deal with in getting rid of things. Too many businessmen are paying too much attention to the things they make and not enough attention to the people who make them, the people who sell them, and the people who use them. It's not things that make life; it's people. It's not things that make business, it's people. . . .

"The sales department must recognize this difference between things and people. It must understand the importance of the human factor. This touches all sides of the sales proposition. The efficient sales manager is essentially a manager of men, not things. He must know his line, it is true; but far more important, he should know his people: the staff who sell his products, the customers who buy his products, and the con-

sumers who use his products. . . .

"The great thing is to link up these three live factors in the selling proposition, so that all work in harmony and close cooperation for the advancement of the house and its products, and, quite as important, for the advancement of each other. . . .

"The master salesman is one who can create business, new business, or a demand for some new article of business. His is the genius of the inventor and the discoverer.

"The development of a successful selling organization is a great achievement. It is not accomplished in a day or a year or five years. It is a process of careful selection, patient training, firm but affable discipline, and persistent, enthusiastic effort. . . . Training such a force involves organization and system. The head of the organization should be the biggest man in the business. He should be a master of system and a leader of men."

So much for Mr. Cottingham's remarks of March, 1912. Some of you are undoubtedly reading Paul Mazur's new book called THE STANDARDS WE RAISE. All I can say is that it would warm the cockles of Mr. Cottingham's heart, for as General Lucius Clay said of it:

"THE STANDARDS WE RAISE" is must reading for those who are interested constructively in maintaining and improving the American standard of living. . . . Mr. Mazur makes a convincing case for America to apply to Distribution the same intelligence it applies to Production."

And you will recall that one of Mr. Mazur's earlier books was the well known PRINCIPLES OF ORGANIZATION APPLIED TO MODERN RETAILING. So the clear relationship of Scientific Management to the necessity for doing a better job of organizing and operating the distribution process has thus been a matter of primary interest to management society people throughout the whole history of our organized management movement.

Just three years ago this fall, you members of this New York SAM Chapter held your own historic meeting on *Cybernetics and Society*, at which Dr. Norbert Wiener, Carl Heyel, Alex Rathe, Luther Gulick and Al Seares told in sobering words about the work of the scientists and mathematicians in applying a combination of old methods of *thinking through* and of fantastic new computing machines to bring a degree of automaticity in shop and office processes which actually incorporates feed back control principles that amount, in one sense, to a form of actual "thinking" by machines. And as the fly sheet on Dr. Wiener's masterly treatise on *The Human Use of Human Beings* said:

"The 'mechanical brain' and similar machines can destroy human values or enable men to realize them as never before."

Linking up the comments of Mr. Cottingham, of Mr. Mazur, and of Dr. Wiener, I think you can begin to sense the deep import of *Scientific Management of the Distribution Process.*

It has repeatedly been said that half the total costs of business come after manufactured goods have left the factory shipping platform. That means that half the work, or more, is in distribution; and that it is done by people whose efforts cry for the same kind of better organization and management as if they were inside the plant instead of dispersed over all the thousands of communities in which their end consumers reside and in which the work of distribution must therefore be carried on.

Hence, the distribution process—due both to the far greater number of human beings involved or affected and to their tremendous geographic dispersion — is equally as vast as, and probably far more complex than, the manufacturing or production process.

What greater challenge could there be to any member of the Society for Advancement of Management? Or what greater field of opportunity—with all the inter-locked variables involved—for creative application both of our best-known management principles and our newest and most constructive "Mechanical Brains"?

In a recent talk to the Association of National Advertisers, I tried to summarize and comment on the *Challenges to Managers* in this curious, thrilling, yet awe-inspiring social and economic climate of ours; with all of the new technology and all of the new global-scale problems which caused Fenton Turck to characterize its changes in the last ten years as literally "The American Explosion."

It is against that background that managers need now to organize and manage the work of associates in their chosen functional field, be it production, distribution, or general management. Those "challenges" fall, I suggest, in four chief categories:

First, challenges to seek and perceive the realities causing customers to feel and react as they actually do in today's domestic economy.

Second, challenges to sense, and to help all business managers to cope with, conditions arising from the technological and political narrowing of the world in which we live; and from the resultant closer inter-relationships and inter-reactions of domestic and international affairs.

Third, challenges to modernize our whole concepts of distribution and of marketing objectives, methods, costs and results in such changing and requiring business, political and social environment; and

Fourth, challenges to integrate both the work and the management of the whole distribution, selling and advertising function into such new marketing concepts and into such actual domestic and World "climate" with wholly new courage, insight and faith.

Let me block out some typical specific "challenges" in each of the four categories.

1. Challenges to Perceive the Realities Governing Customer Reactions in Today's Economy.

• *Economists tell us that people are presently adding to their liquid assets,* at faster than $14 billion per year. This is double the rate of about five years ago. If even this incremental half of such savings were to be diverted to current purchases there would be continued good business rather than any feared recession.

The challenge is: Why are people adding so frantically to their savings? Is it because goods offered are un-needed or are unattractive in quality or price? Or is it because price levels in the actual dollars of the day cause them to fear the adequacy of their savings plans for the future; to a degree where the individual reaction is simply to increase savings to try and keep ahead of "inflation" personally to at least some greater extent than heretofore? Is, perhaps, the heavy current demand for better Pension Plans in Union contracts and for expanded governmental Social Security plans not but collective evidence of such individual fears, thinking and reactions?

And what can managers do to help discover and secure understanding of the realities here involved?

• *People are constantly demanding more security and stability of personal employment.* Demands for a so-called Guaranteed Annual Wage, not only refuse to subside but take on wider emphasis in more industries all the time.

The challenge is: Why are people so

fearful that their source of a livelihood is insecure after the greatest years of increased business volume, productivity, and wage and salary increases in our history? And how can their legitimate desires be best met and their corresponding fears be best dispelled?

Do such reactions not indicate that they still see technological advances—which in fact have been the source of our national industrial productivity, and of our international ability to prevent the overthrow of liberty and freedom—as somehow inimical to them personally? And do not such concepts mean that the people have little faith that mass-distribution is yet able to build new and greater markets as fast as new factories can pour out goods; with layoff of their services as the likely practical balancing factor in the economy?

And what can managers do to help find and disseminate better balanced facts and secure more confident acceptance of constructive trends under such actual circumstances?

• *People are still taking about as long a period of years to accept and widen their use of new products,* such as garbage disposals or dishwashers, as was the case in earlier years for vacuum cleaners or washing machines.

The challenge is: Do such reactions not tell us that the comparative benefits of such new products are only slowly perceived and that pricing geared to current volumes and costs, therefore, does not yet spell *value received* to the large number of prospective customers who, in fact, can afford and would get benefits from such new products?

And what can managers do to expedite understanding and to shorten time-cycles in such cases?

• *People are worried and unhappy at current tax rates and imposts.* They seem to want global defense and personal security on the one hand, but not to pay for it individually on the other hand. Their buying decisions are seriously influenced in an economic sense and their moral fibre is stretched to dodge such taxes in a social sense.

The challenge is: Do such reactions not indicate that political demagogues often have greater influence on their thinking, their votes and their real buying decisions than economists and businessmen?

And what can managers do to help clarify this whole mixed picture? To show people that any military or social program costs money; that such money must come from them through taxes; that such taxes must be reflected in prices of what they buy; and that, given reasonable wisdom in the design of such programs, good products are of value to them at such prices?

Other and similar challenges, arising from actual customer reactions to the world they live in, come readily to your mind, so let us look now at some of those in the second of the four categories.

2. Challenges to Sense and Help Business Cope with Today's Technological and Political World Economy.

• *We are living in a world in which change at a multiplying pace is the order of the day,* as I have already noted significantly. Our technology is ramifying, yet it is interlocked; so that not only its implications but its factual substance defy concrete understanding, let alone practical management. Our means of physical transportation are so astounding that you can be on the site of a happening anywhere in the world in little more than 24 hours with machines already in commercial operation. Our facilities for communication have become so amazing that you learn of an event, almost anywhere in the world, on your radio or TV set, within literally moments of the time it has happened.

The challenge is: Have people to whom only yesterday their local and personal troubles and interests were enough to claim their full attention, yet achieved the understanding and perspective to live serenely, toughly and coolheadedly, in the face of such new awareness of world-wide happenings — and calamities?

And how can managers help them to keep their balance in such an environment? To make their personal decisions again on the basis of factors truly affecting their personal lives and conditions; and not on fears, or even on hopes, springing from events which, however vital on the World scene, will not in fact make much or early difference to them as individuals?

• *Business managers also must suddenly take account of happenings far afield in making plans and decisions for their own domestic enterprises.*

Steps intended to protect the existence and freedom of friendly nations—like the resistance of Communist aggression in Korea—bring international reactions in the form of doubled and tripled prices for raw materials needed in both military and business programs. Or, resultant upsets to historic trade routes of such allies, bring efforts on their part to compete quickly on a new scale in our domestic market here, to help redress the hurt balance of their own internal economies. Fears arise on their part when the United States holds firmly to principles to prevent the destruction of liberty, that resultant economic imbalance will be so severe as to create disruptive stress and unrest among their own citizens. Or fears crop up that when our military production finally slacks off, we will have a depression that will be world-wide, and thus harmful to them, in its repercussions.

The challenge is: Do the leaders and people of such friendly countries, or even the Managers and employees of our own businesses, not let such fears influence their personal, business and governmental decisions to a degree which has direct, and often unnecessarily adverse, effects on the sales and profit levels of your company and mine?

And how can managers help to bring light, sanity, tolerance and patience into this kind of situation? And so to help keep sales, profits and the stability of employment and of the general economy on a more even keel?

• *Political leaders have to be re-elected at fairly short intervals.* Hence they almost inevitably tend to yield to local, nationalistic and short-range influences in charting their courses. Differences between their respective countries are magnified, rather than reconciled or minimized, accordingly.

The areas in which there is similarity of purpose and of common understanding are thus only too few at the international level, whose happenings nevertheless have such direct impact on local business progress and climates today. The languages of science, of the great religions and of private business organization and management offer such islands of common purpose, where long-range and fundamental principles and truths temper the vagaries and expediencies of current decisions and storms.

The challenge is: How can such fields of common purpose be better integrated and more surely sensed, understood and propagated? And how can business managers help statesmen, as well as each other, with such trends and problems?

The list could be extended at length but let's look instead at the third category of challenges.

3. Challenges to Modernize Our Whole Concepts of Distribution and Marketing Objectives, Methods, Costs and Results.

If the first two categories have seemed somewhat general, and perhaps of only

indirect impact and interest, this category at least hits closer to home in the light of our topic. What kinds of challenges, therefore, fall in this field?

• *A recent success story* in BUSINESS WEEK noted how a former used-car dealer has created a Company which, to quote, "In four short years . . . has elbowed its way into the top 10 TV set producers . . . by a combination of Hollywood-ballyhoo sales promotion, low prices in factory-owned retail sales outlets, and a flexible manufacturing-distribution set-up that can shift direction in a day's time."

Or you can take a look at the progress of an old national retail organization which is now carving out an increasing market position in the manufacture and the sale through carefully placed regional warehouses and local retail stores of a wide variety of consumer durables, from refrigerators to automobiles. And, like the above-mentioned TV manufacturer, is selling such products in local markets at low delivered prices; and at prices which may vary distinctly from region to region, as well as from season to season.

Or, as another "success story" in FORTUNE further points up the picture, "How come a home-grown dishwasher from Kansas is right up among industry leaders?" The article tells how they cobbled up the device to do the job satisfactorily for the customer; and then goes on to tell how they got a market in fast enough time to meet their debts. Apparently the distribution strategy, since they were "unknown," was simply to bypass the appliance wholesalers for a few prestige department stores, give them a three-to-six month exclusive, and let them promote the new make until the distributors took notice, despite the expedient nature of this approach.

The list of such new developments could be extended but to do so would only emphasize that fresh thinking, often by uninhibited newcomers, is exposing every traditional step in the marketing process to critical re-examination in the light of today's realities.

The challenge is: How can established and traditional distribution and marketing organizations, concepts, methods and channels meet such new economic requirements and such new competition fairly and successfully? And how can managers aid them to do so?

• *The whole class of "middlemen" in distribution of manufactured products is clearly threatened by such modern developments,* which are already day-to-day realities and not mere theory or speculation. Yet such middlemen, or owners of small selling, contracting or servicing businesses in local communities, have been the backbone of business, of economic progress, of public service and of social responsibility in preserving a climate receptive to competitive, private enterprise throughout the nation. Will it be good, for all concerned, if they are blacked out by new methods of distribution where, as one article claimed, local retail outlets are frequently operated at a loss to keep factory loads more steady; where local managers are paid a salary or commission, are limited to centrally defined, budgeted expenditures and work, and are forced to ship their daily collections out of the local community by telegram at 2 pm. each afternoon?

The challenge is: How can excessive delays, investments, expenses, time lags and people in the traditional channels of marketing and distribution be streamlined in methods and in management, to get similar, and competitive, results, without being obliterated entirely?

And how can managers contribute to probing for, and finding, constructive solutions to the problems so faced?

• *Modern, highly automatic factories can now be designed and managed to produce almost any kind of goods, apparatus or products in huge quantities and at low costs—if they are run steadily at capacity volume.* But such plants have high invested capital at today's price levels. Hence they have high fixed depreciation charges, property taxes, and capital money costs; and high salaried and maintenance payrolls whether they run or not, but pretty low direct labor and other controllable costs. This, whether you like it or not, is the "Factory of the Future" and it is already here for all practical intents and purposes.

Under such conditions, poor sales forecasts and slow, costly, inflexible channels of distribution are intolerable; because such factories, in effect, either run at high volume, or put the whole enterprise in the economic sink. They are the product of intensive research, and of application of its findings, in both product and process technology: and also in such professional management approaches as Work Simplification, Time Measurement of Micromotions, Industrial Engineering, Feedback Controls and, now the whole field of Operations Research. With such Manufacturing facilities as integral parts of the combined producing-distributing economy, they require distribution and marketing thinking, research and management philosophy rooted in similar concepts, approaches and technologies, or the whole economy becomes an unbalanced mess.

The challenge is: How can similar advances be achieved — both in handling goods and materials and in creative Selling techniques—to bring mass-distribution into balance again with the mass-production facilities and organizations so obviously in place?

And how can managers assist in redressing such balance? And help to do so in time to prevent economic repercussions that could have disastrous social and political consequences, both nationally and internationally?

Again the list could be expanded in various directions, but let's, rather, observe a few challenges in the fourth category.

4. Challenges to Integrate the Work and Management of Distribution, Selling and Advertising into Modern Concepts and into Resultant Company Programs and the Prevailing Economic "Climate."

In a sense the challenges in this category are implied in all of the three fields just outlined. But to focus them up more sharply, they may be re-stated in such terms as these:

• *The relative importance of selling and of advertising—versus each other and versus other business functions—varies from business to business;* chiefly according to facts as to three elements namely:

(a) Nature of the product—including its price, ease or difficulty of application; and degree to which "packaged" rather than "custom"; for example, a lamp bulb versus a turbine.

(b) Nature of customer at ultimate point of sale: e.g., a housewife buying a lamp bulb in a dime store versus the chief engineer of a large utility company.

(c) Nature of actual sales person at point of actual sale—for example, a Woolworth clerk to ring up the money and put bulb in a paper bag, versus, maybe, the General Manager of the turbine manufacturing organization.

And finally, where neither the ultimate "customer" as an individual, nor the specific "sale" point is identifiable at all, practically the entire job has to be done by advertising, instead of personal, face-to-face selling; which is the case where the objective is to sell an institu-

tion, an idea or a program, rather than a product or a specific service.

The challenge is: How to determine the correct organizational set-up needed —at a particular time, and under varying conditions—to fit selling and advertising into the over-all marketing "envelope" appropriately, in accordance with the above three elements?

And how can managers fit the economics and the teamwork of each such product business flexibly yet productively together on a responsible, continuing basis?

• *Certain characteristics of selling, advertising and distribution create particular need for skilled Planning*, for instance:

(a) The "time-cycle" for effectiveness is often long-range; great ideas are not sold, nor are large numbers of individual convictions sincerely formed, or reversed, in an accounting month or year. Today's "sale" may really have come from Advertising ideas or copy, or from a Sales Promotional Program of 1948—which no one now even recalls!

(b) The "mass-selling" nature of the task involves approaching large numbers of people—even for industrial products—to influence them to open their minds. This is not a "half-hour interview" task; it is a broad, "long campaign" kind of job.

The challenge is: How can the requisite timing for effective, solid Distribution progress be insured and provided for, when normal business budgets are customarily prepared for much shorter accounting periods; and when the difficulty of measuring and matching distribution costs with definite results therefrom presents difficulties and intangibles of great scope?

And how can Managers face such problems, evolve sound programs in the premises, and learn to measure costs and productivity consistently enough, and factually enough, to achieve the cooperation and support needed to meet such challenges specifically?

• *Advertising work, in particular, has typically been regarded as a "specialty"* and advertising men have typically been inclined to associate with, and get wholehearted acceptance of each other from, other advertising men, at various echelons of management and even in agencies and other consulting groups. Yet in today's tightly interlocked businesses, with engineering, manufacturing, marketing, financial, legal and human relations programs of necessity dependent on integration with each other for success, unless the advertising personnel and plans are part of the accepted concept and "team work" of all these other functional people and managers, they will, in effect, be trying to operate in a functional vacuum.

The challenge is: How can the advertising manager integrate his work and people into such manager teams through more direct contacts of himself and his professional competent advertising men with the salesman, the engineer, the shop manager, the financial manager, of his specific, decentralized business; and yet not lose the benefits of interplay of ideas and contacts between one advertising man and other skilled, creative advertising men?

And how can managers, including advertising and marketing managers, themselves move to retain their own professional pride and creativeness, yet integrate closely with all other functional specialists on the business management team?

• *Much actual marketing, distribution and advertising work has been done, not by men on the company payroll, but by turning to specialized talent in various jobber and retailer businesses and in highly competent, professional advertising agencies*, who have so built up their services, contacts and concepts that they will continue to be the chief reliance for such services in the future in most cases and situations.

Yet business functions are becoming more closely inter-dependent and more harmfully impaired if less closely-geared personnel in "outside agencies" are used, so that team-play is more difficult than if all involved are on a common payroll under a common manager and common ownership.

The challenge is: How get full mutual understanding and benefits in selecting and using such non-owned distribution and advertising agencies and services? How get people responsible for the company side of the contacts who are themselves of corresponding skill and professional competence; even if only one such man is on the company payroll, multiplying himself by calling on the pools of talent in these other allies and agencies who perform (and manage) such basic parts of the whole distribution process?

And how can Managers achieve best integration of needed talents and of requisite over-all Business team-work, amid such diverse relationships?

• *Finally the man who does the work of marketing, selling, advertising or distribution has the same need to manage his own, precious man-hours of working time as any other employee or manager.* This is both to preserve his health and keep him on the job; and it is also to avoid those more serious, but often hidden, losses which occur when a man is physically on the job but either physically or emotionally tired—yet trying to do creative work which, in its very essence, calls for a free, unfrustrated mind.

The challenge is: How can the work of distribution personnel be so defined, evaluated, organized and managed as to concentrate creative man-hours for the truly essential and creative parts of the distribution and marketing job; delegating clerical, purchasing, costing, accounting, office management and similar other duties to others who themselves are skilled pros in those kinds of specialized and equally necessary work?

And how can managers thus stick to the big creative tasks which they face—and must be able to do — in the economic, political, social and technical climate in which today's complicated business activities must in fact be managed?

As in the case of the other three categories of challenges, those just cited are only typical, rather than indicative of the full scope of the marketing problems which both the general manager and the marketing manager face in fact today. The list suffices, however, to show the great breadth and depth of his job today; and to emphasize his need to bring to it the same improvements and advances in the work of managing distribution which have brought important advances in other managerial fields.

The significant aspects and future characteristics of the work of the marketing or distribution manager is well indicated by this imposing list of typical challenges and problems which he faces and needs to overcome.

The fact is that the problems of marketing management have now clearly become so significant and so varied that they need to be subjected increasingly to the same kind of scientific analysis which has been found so effective in factory management; yet with need to devise special techniques appropriate to this particular managerial work, fully recognizing both its special characteristics and its differences from factory or other functional management tasks. The problem, in short, still has all the importance, and all the difficulty, which Mr. Cottingham visualized so ably some forty years ago; except that now it is

your problem and mine instead of that of our distinguished predecessors of those by-gone days!

The marketing manager, however, faces the same paradox as other functional, or general, managers today. He is groping into the future to conduct activities which are ever more complicated, ever more technical, ever more difficult to understand. Yet he is always searching among such complexities to find patterns of simplicity in them which can be picked out and delineated as images so that all the people in the business can get a mental picture of what is going on, of how their own efforts and needs fit into the work as a whole, and of how they need to conduct themselves, both as individual workers and also as team workers, to carry forward with initiative, with satisfaction, and on a voluntary basis.

Methods and equipment and problems thus move forward, but they still have to be operated and managed by manpower.

Hence the root nature of the task of managing remains the same as it was in Mr. Cottingham's day; namely, that of exercising leadership through planning, organizing, integrating and measuring the use of both the human and the material resources of the enterprise being managed.

The principles involved in the work of managing are, of course, not new. They go back through the years, and indeed through hundreds of years as the literature in the field so amply demonstrates. What is new, of course, are the changing circumstances and conditions to which, and under which, such principles must be applied; in order that a forward-looking manager may be doing the things today that will keep his business enterprising, competitive and growing, rather than bureaucratic, defensive and stagnant, for tomorrow.

The American answer, as always in the past, to such changing conditions and challenges, both technical and social, is to use the human mind boldly to study and to define the problems involved; and to do so as rigorously and quantitatively as possible. With the tasks thus clarified, available alternative methods of solution can in turn be clearly defined and appraised and the best among them chosen in the light of the research so applied and the facts so developed, rather than merely on the basis of hunch, or even of the past personal experience of the individual manager.

This work of managing, in a professional as distinct from a command or a dictatorial sense, has been described as that of leadership by blending thought and action. There are times when the man of action seems to have the center of the stage. At other times it seems as if only the man of thought can find a way out of the difficulties which beset us. As you practical managers know, however, it is the capacity to blend the two approaches—and to plan the best use of both the human and material resources being managed, in doing so—which distinguishes the creative, enterprising and able manager from his less successful brethren.

Under such concepts the work of the manager in the field of distribution is the same basic kind of work as that of the manager of men engaged in any other activities. Of course, he must have the requisite technical skills in understanding of the broad abilities and relationships involved in creating and administering effective marketing programs and activities; but equally he must have knowledge of the fundamental nature of the work of a manager as a professional kind of work, distinct in itself. As just indicated, this work consists of exercising leadership, by persuasion rather than coercion; and of doing so within the authority specified for given positions in his particular production or distributing firm. This authority may be either to decide, to recommend for decision, or merely to advise, through the sub-functional kinds of managerial work which may be called planning, organizing, integrating and measuring. All are aimed at achieving the common purpose of the distribution or marketing component, as well as of the enterprise as a whole, and at doing so effectively, harmoniously and economically through good voluntary individual initiative, work and teamwork.

The managerial tasks of planning and of organizing (setting objectives, policies, plans, schedules, programs and methods) and of putting in place and staffing the right organization structure to accomplish resultant required work to carry them out are, of course, familiar fields of management effort. I would like, however, to review a little more fully what is really involved in the managerial tasks of *integrating* and of *measuring*.

Integrating is really the key part of managerial work, and includes coaching, teaching, inspiring, motivating, and compensating all the people to whom the work of the enterprise or component has been thus assigned, so that each sees his own part clearly, as well as its relation to other parts and to the whole. Each must see the relation of the whole to the industry, the community and the nation, and thereby the way in which he as an individual can so do his own work on his own initiative, and do it in teamwork with his fellows, so that the individual jobs naturally integrate back to the end result determined as the goal of the enterprise.

Note that this differs from either "command" where a goal is imposed and the principles to be applied by individuals are dictated; and also from so-called "compromise" or "coordination," where arbitrary choices between views of different people are imposed, which may well be satisfactory to nobody. In essence, the principle is that in any collective enterprise, while the liberty of the individual is restricted to the extent needed to allow for the corresponding liberty of the other individuals concerned, the result is good if the resultant "collectivism" represents voluntary association and team-work, rather than some relationship forced from without. The gist of it is that a man in doing his job is responsible not only for the work internal to it, but for the work of integrating it suitably as to its relationships with all others affected by it or which affect it.

And finally, measuring—which is distinctly different from controlling in concept—involves finding the ways to measure each part of the work being done under the various elements of the plan, in accordance with the schedules and standards determined; to know how well it is being done and how well it is contributing to achievement not only of the individual job, but of the common purpose. Not only must the factors to be measured be thus determined, but also the units, coefficients or index figures which are to serve as measuring yardsticks; as well as the means of making such measurements and bringing them together for analysis and use. This measuring type of managerial work also involves analyzing such figures, attempting to summarize and report them, and then distributing and making them available in usable form for interpretation by others. It involves giving any general interpretations that occur to the trained Measuring, or statistical, expert. These latter interpretations, however, are in the nature of advice and help rather than command to the people whose performance is being measured, since it is basically up to them, once the facts as to their work are thus placed at their disposal, voluntarily to take requisite ac-

tion. As the measurements are thus made available to the people who can and should use them (again from the bottom to the top levels), it is up to each basically to use this "feed back" information, in order to start again the process of adjusting the planning, the organizing, and the integrating work of managing. This will produce a closed or continuous process, where the measuring factor feeds back new information to correct the whole and to keep it going forward to achieve the common purpose with the requisite momentum and with adequate economic as well as human satisfactions.

It is clear, of course, that this is a somewhat over-simplified presentation of the fundamental philosophy, and even theory, of the nature of the work done by a "professional manager," whether he be managing a Marketing component, a factory, a sales district, an accounting office, or the business as a whole. The point is that in today's complex corporate organizations there is the same need for a manager in the field of marketing and distribution to have a deep appreciation of the work of managing as there is for him to have sound professional competence in marketing and advertising work as such.

The two are like the impressions on the opposite sides of a coin; it is not good money unless valid on both sides.

The challenge to all business managers—and thus to marketing and to production managers alike—is to get organized to meet both the short and the long-range demands imposed upon you by the need to operate in the economic, social and political climate which sets the dimensions of our highly technological industrial society of 1953.

A mere statement of both the challenges and opportunities which we all must face in these exciting times must indicate to you that they are so great, and that they call for the integrated efforts of so many other people, that we all must polish up our managerial skills if we are to meet them successfully at all.

The challenge of the day is, therefore, that *production* in the mass sense can now be developed for most any business, even for what used to be "blacksmith shop" kinds of businesses. Materials are again in supply and factory capacity is at a record high. Distribution, or plain hard selling, including Advertising and at all stages of all channels of Distribution, thus has the monkey transferred to its back.

The task is big. Half the costs of business are said to be "beyond the factory shipping platform." The task is hard; the customers are dispersed. Unlike the manufacturing manager, the marketing, selling or advertising manager can't get all these people under one shop roof to work with them. He has to go to them or get his messages to them in all the thousands of communities all over the nation and the world.

My point is that the analytical, even the statistical and indeed the computer, as distinct from the intuitive, approach to the resultant managerial tasks involved will be as effective in distribution, marketing and advertising as it has proved to be in production. But only when we get distribution, marketing and advertising managers who will develop, understand and use this approach. It involves learning to *think through* along the lines of the professional design and Industrial Engineers or Accountants in their functional areas. But in this day, when manufacturing capacity is no onger the determinant of production schedules or outlook, and when investments in such capacity, if not used at high load-factor, will still cause costs of a level to stop sales or cause sales at a loss at prices set by more ably managed competitors, the job of getting the customers and of getting the business to load these modern, high-cost production facilities which require such long hours of use to achieve low-cost output, is the really new challenge to all managers in the distribution and sales fields in which we all now live.

The time when it was only necessary to get orders at prices sufficient to recoup current material, labor and service costs, with quite low added charges for depreciation, property taxes and money cost on building and equipment investments already largely written off in past years, is increasingly but a fond memory.

The billions of dollars of new money in fixed plant installed at today's higher price levels, on which high taxes, depreciation and money costs must be covered in sharply-higher product prices before profit can be derived, is the distribution man's challenge for 1954 in an economic sense. And this challenge is multiplied by all of the deep-seated social and political forces simultaneously playing on and affecting customer minds and decisions.

To overcome that challenge it is plain that new types of managerial skill are of the essence. In the leadership of distribution, as of all other functional activities, it is the biggest job that any of us has yet faced. It must be faced against ever deeper and more complex industrial and legal conditions. It will call for creative skills and for imagination of new daring and capacity. It will call for professional managerial competence and ability, as well as for technical, functional proficiency in distribution, marketing, selling and advertising. END

Scientific Management Needed in the File Drawer, Too

Most companies keep too much filed material too long. The persons who work with files rarely throw out anything, because they have no authority to do so. They would rather have too much information filed than not enough, because it might be needed. Higher officials should, therefore, issue firm directions instructing subordinates to throw out old materials. The Westinghouse Electric Company some time ago found that its files needed clearing out. When the job was finished, 120 freight carloads of obsolete and useless papers had been discarded and another 300 carloads had been transferred to records centers and archives! The Sun Oil Company disposed of 500 tons of records in one three-year period! —*Franklin G. Moore, Manufacturing Management*, p. 762.

Authors In This Issue . . .

B. H. JARMAN is Professor of Education and Director of the Summer Session at George Washington University, where he has been since joining the faculty in 1945. A Doctor of Education (George Washington, 1938) Mr. Jarman has held a series of academic positions and has been a frequent contributor to educational journals, as well as keeping an average of one speaking engagement a week. In addition, Mr. Jarman is a member of the Washington Board of Trade, a member of the United States Civil Service Committee of Expert Examiners (since 1950), a life member of the National Education Association, a member of Rotary, a director of the Community Chest, and an affiliate of four honorary fraternal organizations (education, leadership, social science, and service). A career oriented toward the development of thinking processes well fits him to apply the technique to executive training (see page 5).

DR. LUCIEN A. BROUHA is the Chief Physiologist at the Haskell Laboratory for Toxicology and Industrial Medicine in Wilmington, Delaware. He has a distinguished record as a physiologist and medical research specialist here and in his native Belgium. His thorough and important article on fatigue (page 9) stems in part from work done when he was Research Fellow at the Harvard Fatigue Laboratory from 1939 until 1942, which position he left upon assuming duties as a physiologist with the Office of Scientific Research and Development and later as consultant to the Chemical Warfare Service of the United States Army. Dr. Brouha is the author of numerous papers in the fields of endocrinology, the physiology of the autonomic nervous system, the physiology of muscular exercise, and industrial physiology. Two of his longer works, books on sex hormones and endocrinology, were published in Paris in 1938 and 1953, respectively. Dr. Brouha is a member of the American Society of Physiology, the Canadian Society of Physiology, the French Association of Physiologists, the International Federation of Medicine, and the recipient of awards from the Paris Academy of Sciences (1934), the Paris Academy of Medicine (1930 and 1938) and the Academy of Sciences in Brussels (1930).

HAROLD F. SMIDDY joined the General Electric Company in 1943, holds the position of vice-President with that organization. Prior to his association with GE, Mr. Smiddy was a partner in the industrial management consultant firm of Booz, Allen and Hamilton. At the present time, Mr. Smiddy is vice-President and Director of the Council for International Progress in Management, and is a former vice-President for Management Research and Development of the Society for Advancement of Management, as well as a member of the American Society of Mechanical Engineers. ADVANCED MANAGEMENT for September, 1953, contains Mr. Smiddy's most recently-published work, on the subject of the interchange of management know-how. Mr. Smiddy will be remembered by those attending the SAM Management Conference at the Hotel Statler in New York, October 29-30, 1953, as the recipient of the Taylor Key Award, given annually by The Society for outstanding work in promoting the principles of scientific management as originally conceived by Frederick W. Taylor. The award went to Mr. Smiddy for his national and international activity in professional organizations and in private industry, where he successfully led a unique effort to integrate a team of management consultants within a large corporation. In the current issue (page 20) he turns his attention to an ever-present problem of management, the distribution process.

SAM Chapter Performance Awards Report

for the period, July 1, 1953 to October 31, 1953

CHAPTERS	TOTAL	CHAPTERS	TOTAL
Kansas City	6742	Chicago	2491
Lancaster	5058	Providence	2490
Worcester	4456	Detroit	2446
Western N. C.	4145	Boston	2233
Trenton	3906	Binghamton	2220
Hudson Valley	3823	Manchester	2209
New Haven	3743	Greenville	2175
Raritan Valley	3672	St. Louis	2091
Baltimore	3573	Western Mass.	1889
Greensboro	3572	Fox Valley	1738
Philadelphia	3491	Knoxville	1700
Clearing	3346	Richmond	1391
Nashville	3240	San Francisco	1388
Central Penna.	3220	Indianapolis	1180
Northern N. J.	3209	Twin City	860
Lehigh Valley	2981	Washington	854
Reading	2972	Wilkes-Barre	830
Milwaukee	2916	Charlotte	765
Pittsburgh	2855	Sacramento	749
Columbus	2843	Central N. Y.	452
Montreal	2805	New Orleans	304
Madison	2780	Bridgeport	290
Birmingham	2777	Cleveland	264
Dallas	2774	Louisville	248
Wilmington	2774	Dayton	50
Portland	2684	Stamford	50
New York	2683	Los Angeles	36
Hartford	2652	Calumet	—
Atlanta	2631	Cincinnati	—

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ADVANCED MANAGEMENT

welcomes the newly-organized

Calumet Chapter

to the Society for Advancement of Management. The charter members of the SAM Calumet Chapter represent one of the most important industrial and business areas in the United States today. They well serve to emphasize the encouraging growth and active sense of responsibility that characterizes the already flourishing present Chapters of the Advanced Management movement in modern American business.

The Charter of the Calumet Chapter was presented at a meeting held December 7, 1953, by SAM Executive Director Dr. C. A. Slocum. The officers of the new chapter were installed by Louis A. Lukenbill, vice-President of Chapter Operations. Following the presentation and installation ceremonies, the members were addressed by Dr. R. B. Stewart, the vice-President of Purdue University, who spoke on the subject of contemporary commercial development.

At the conclusion of the chapter meeting, each member received as a token an individual copy of the SAM Charter containing the members' names, framed suitable for hanging in his office.

The organization of the chapter is as follows:

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National Director:
C. H. Creasser, Combustion Engineering, Inc.

President:
W. W. Reed, Socony-Vacuum Oil Co., Inc.

Vice-President, Program:
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Vice-President, Membership:
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Vice-President, Arrangements:
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Directors:

A. Cochrane, Youngstown Sheet & Tube Co.
A. F. Endres, Standard Oil Co.
M. D. Schmid, Purdue University Calumet Center
C. L. Stewart, Keyes Fibre Co.
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CHARTER MEMBERS

Angle, J. E.	General Superintendent	United States Steel Corp.
Arner, R. G.	Manager	Sinclair Refining Company
Bacon, A. H.	Production Manager	W. B. Conkey Company
Bagby, W. J.	Plant Superintendent	Carbide & Carbon Chemicals Co.
Bold, W. J.	General Production Manager	Rand McNally & Company
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Challman, H. G.	Production Manager	Standard Forgings Corporation
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Griscom, E. W.	Asst. General Manager	Sinclair Refining Companq
Gustafson, L. G.	General Superintendent	Continental Foundry & Machine Co.
Hayes, A. H.	General Superintendent	Standard Oil Company (Indiana)
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Krejci, E. L.	General Manager	American Steel Foundries
Langeland, E. E.	Vice President, Production	American Maize Products Co.
MacGregor, David	Works Manager & Chief Engineer	Edward Valves, Inc.
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Rich, F. M.	General Superintendent	Inland Steel Company
Riley, W. J.	President	Union National Bank
Schmid, M. D.	President	Industrial Management Engineer
Solenberger, C. F.	Plant Asst. Superintendent	Carbide & Carbon Chemicals Co.
Stewart, C. L.	Superintendent	Keyes Fibre Company
Stewart, G. L.	General Manager	W. J. Holliday & Company, Inc.
Taylor, E. W.	President	S. G. Taylor Chain Company
Taylor, J. E.	Asst. Vice President	Mercantile Natl. Bank of Hammond
Taylor, L. E.	Manager, East Chicago Refinery	Cities Service Oil Company
Thomas, P. E.	Asst. General Superintendent	United States Steel Corporation
Vohr, J. H.	General Superintendent	United States Steel Corporation
Watson, R. B.	Manager, Standards Department	Combustion Engineering, Inc.
Weil, W. W.	Plant Superintendent	Hammond Brass Works
Wible, R. R.	Special Representative	Socony-Vacuum Oil Company, Inc.

JANUARY CHAPTER ACTIVITIES

CHAPTER	SUBJECT	SPEAKER	TITLE	PLACE	DATE
Atlanta	Cost Reduction and Control	Paul B. Mulligan	P. B. Mulligan & Co.	Atlanta Athletic Club	14
Baltimore	Collective Bargaining and the Industrial Engineer	Dr. William Gomberg	Director Management Engineering Dept., ILGWU	Stafford Hotel, Mt. Vernon Place	5
Binghamton	Getting Results Through Management	Gen. John Hildring	General Aniline & Film Corp.	Arlington Hotel	20
Birmingham	Management of Trusts	C. F. Zukoski, Jr.	V. P. & Trust Officer, First National Bank	Molton Hotel	12
Boston	Executive Development	George Corless	Advisor on Executive Development, Standard Oil Co., N. J.	University Club	7
Central Pennsylvania	A Week In Moscow—Ladies Night	Rebecca F. Gross	Editor, *Lock Haven Express*	State College, Pa.	21
Chicago	Industrial Engineering Forum				12
	SAM Job Clinic			Northwestern Univ.	16
	Are You Ready for Promotion?			Furniture Club, Furniture Mart	26
Cincinnati	The Staff Function			Hotel Alms	7
Clearing	Budgets	E. A. Gustafson	Atlas Boxmakers	Atlas Boxmakers	5
	Foreman's Council			Clearing Club	12
	Harvard Case Study	J. M. Duffy		Bethlehem Steel Co.	13
	Preventative vs. Breakdown Maintenance	J. A. Hartwick	Kellogg Switchboard	Clearing Club	14
	The Money Movers	H. E. Reeves	Pres., Brink's, Inc.	Clearing Industrial Club	21
	Plant Safety	E. Matz	Personal Products Corp.	Clearing Industrial Club	26
	Harvard Case Study	J. M. Duffy		Bethlehem Steel Co.	27
Cleveland	You Can Fire One-Third Of a Clerk	Frank M. Knox		Hotel Cleveland	11
	Industrial Engineering Round Table	Nevin K. Brothers		Tomlinson Hall—Case Campus	18
	Top Management Round Table	Hugh D. Luke		Tomlinson Hall—Case Campus	20
	Industrial Relations Round Table	Edwin D. Phillips		Tomlinson Hall—Case Campus	25
Columbus	Production Planning & Control in Small Lot Manufacturing	E. J. Milinar	Plant Mgr., Independent Lock Co.	Ft. Hayes Hotel	21
Dallas	Membership Dinner	Eugene J. Benge	Mgmt. Consultant	Melrose Hotel	13
Dayton	How Well Do You Pass the Word Along?	Paul R. Beall	Advisor, Air Research and Development Command, USAF	Engineer's Club	26
Detroit	New Horizons Through Work Simplification	Ben S. Graham	Dir., Methods Res., Standard Register Co.	Rackham Memorial	5
Fox Valley	Sales and Operations Planning and Control	Theodore W. Bonnevier	Controller, Acme Steel Co.		14
Greensboro	Time Study Conference			Hotel Robert E. Lee	28 & 29
Greenville	Traffic Management	Prof. W. Way, Jr.	U. of Tennessee	Hotel Greenville	13
Hartford	Value Analysis	L. D. Miles	General Electric Co.		21
Hudson Valley	Case Histories in Cost Reduction	Robert A. Davis		Hendrick Hudson Hotel, Troy, N. Y.	5
	Production Control—Proper Inventory Size	Harold W. LeBoeuf Robert Treat	General Electric Co. General Electric Co.		21
Indianapolis	Meeting Competition	Wayne Johnston	Pres., Ill. Central R.R.		13
Kansas City	Joint Meeting With ASME			The Wishbone, Kansas City	11
Knoxville	Human Relations	Flem Winders	Tennessee Eastman Corp.	Farragut Hotel	14
Lancaster	Business Outlook in 1954	E. Dorsey Foster	V. P., RCA	Hotel Brunswick	19
Lehigh Valley	Human Relations in Industry	Paul S. Beaver	Head, Management Training Dept., Penn State College		12

CHAPTER	SUBJECT	SPEAKER	TITLE	PLACE	DATE
Madison	Supervisory and Executive Selection	Floyd Larkin	V. P., Wisconsin Electric Power Co.	Hoffman House	6
Manchester	Plant-Community Relations	Clifford H. Miller	General Electric Co.	Carpenter Hotel	6
Milwaukee	Developing Your Organization Gradually	Norris Perris	Stevenson, Jordon & Harrison, Inc.	E.S.M. Building	14
Montreal	The Armed Forces Executive Development Program	RCAF Officer		Ritz-Carlton Hotel	13
New Haven	Industrial Relations Round Table —Health and Safety in the Large Plant			American Brass Country Club, Naugatuck, Conn.	13
	Industrial Engineering Round Table—Internal Organization			Board Room, New Haven Chamber of Commerce	14
	Top Management in Connecticut	James A. Walsh	Board Chairman, Armstrong Rubber Co.	Towne House, New Haven	21
New York	Methods Improvement—How to Maintain an Active Program	Don Copell	V. P., Wagner Baking Co.	Roosevelt Hotel	21
Philadelphia	Mass Producing America's Fashions—Ladies' Night			Poor Richard Club	5
	Executive Compensation	Vincent Kelly		Atlantic Refining Co.	6
	Training of Maintenance Supervision	J. Tyler		Exide Crescentville Plant Conference Room	7
	Plant Tour—Link Belt Co.	A. J. Waring			19
	Engineering Compensation	L. Catlin		Atlantic Refining Co.	20
Pittsburgh	Who Actually Runs Your Business	James W. Irwin	James W. Irwin Assos.	Webster Hall Hotel	21
Portland	Small Business Counseling—Ladies Night			Ireland's at Lloyd's	27
Providence	A Novel Production Control Plan	Henry D. Sharpe, Jr.			7
Raritan Valley	Plant Visit—Manpower and Equipment Utilization Programs	Frank J. Dutoit	Manpower & Equipment Engineer, Merck & Co.	Merck & Company, Inc. Rahway, N. J.	20
Reading	New Responsibilities for Management	Harold B. Maynard	Pres., Methods Engineering Council	Iris Club, Wyomissing, Pa.	11
Richmond	Benefits of Use of Methods—Methods Engineering Council			John Marshall Hotel	26
	Annual Time Study Conference			Robert E. Lee Hotel Winston-Salem, N. C.	28 & 29
Sacramento	Collective Bargaining				12
St. Louis	Applying Industrial Management Practices to Distribution and Non-Manufacturing Industries	Thomas F. Jones	Asst. Manager, McKinsey & Company		12
Trenton	The Industrial Development of the Upper Delaware Valley	Edward A. Thorne	Freeholder & Dir., Mercer Cnty. Ind. Comm.		19
		John T. Welsh	Commissioner, Bucks Cnty.		
		Alfred Hess	Public Service Elec. & Gas Co.		
Twin City	A Phase of Productivity	Gale McElrath		Minnesota Union	14
Western Mass.		Gordon Fromm	Johnson & Johnson	Ivy House, W. Springfield	21
Western N. C.	The Ford Reorganization	Charles M. Bosworth	Mgr., Organization Department, Ford Motor Co.	Battery Park Hotel, Asheville	20
Wilkes-Barre	Engineering Economics	C. E. Bullinger	Head, Ind. Eng. Dept., Penn State College		
Wilmington	Use of Operations Research	Dr. John B. Lathrop	Arthur D. Little, Inc.	Hob Tea Room	14
Worcester	Savings Through Better Materials Handling	James R. Bright	Editor, *Modern Materials Handling Magazine*	Hickory House	11

AM Advertising Review . . .

A Case For Industrial Advertising

by John Fistere, Manager of Sales Development for Fortune

Note: In the November 1953 issue of "Fortune at Work," a monthly sales promotion booklet that is read by thousands of executives, the following short article appeared.

With less than 600 words, Mr. Fistere has given us from his own extensive experience, a complete analysis of the importance of continuous industrial advertising. It ranks above anything ever written about the business press in this country. Free reprints are available. Address Frank E. Fehlman, Society for Advancement of Management, 74 Fifth Avenue, New York 11, New York.

In most industrial purchasing, there is very little "selling" in the normally accepted sense. Seldom is one product better than another product in the sense that one soap powder is better than another soap powder. A woman buys Tide because she likes Tide, and not because she prefers to do business with Proctor & Gamble. But a man might buy steel from one company, let's say, *not* because its steel is any better than another's but for a wide variety of reasons, many of them having nothing to do with the product itself. *Most of these reasons are direct reflections of the reputation of the company.*

So, one of the major functions of industrial advertising is to establish *the kind of reputation for the company*—and inferentially the product—that will influence the eventual sale.

In this connection, I think it might be a Du Pont vice president as saying: appropriate to quote a statement that appeared in FORTUNE in an article on industrial selling called, "The Million Dollar Sale," in which FORTUNE quoted *"Policy decisions on major purchases are based on confidence in the management of the vendor."*

The implications of that statement are the foundation of a large part of industrial advertising . . . *"major purchases,"* it says, *"are based on confidence in the management."*

There are, of course, half-a-dozen different ways in which confidence is inspired. Personal contact between the managements of buyer and seller is, of course, of first importance. There is no *substitute* for it. But there is an *extension* of it in the right kind of advertising. Advertising actually extends management's contact with management.

Personal contact is seldom established even with *all* those *directly* responsible for the purchase. This is the job that industrial advertising does effectively and inexpensively.

Some people refer to this kind of industrial advertising as "name" advertising, but it might more properly be called "what's-*in*-a-name" advertising, because advertising of this type does much more than keep a company's name before the public. It helps to form a corporate reputation for the "name." For example, it can create an impression of "leadership," of financial soundness, of engineering resourcefulness, of production dependability—and many other attributes that should be associated with the corporate "name."

Thus, advertising sells the company and the individual salesman sells the company's products and services.

Other Functions

Of course, there are other functions of good industrial advertising. Obviously, when inquiries *are* desired, for example, advertising can provide new leads for the sales staff. But in this connection, it is interesting and possibly significant that the better known a company is, the more likely it is to advertise for inquiries; and the less well known the company, the more attention it pays to establishing, through its advertising, a corporate reputation. One of the most interesting examples of this is Monsanto Chemical, which began advertising in FORTUNE 16 years ago with the sole aim of establishing its corporate reputation. Today, with that achieved, Monsanto has become a consistent advertiser of its products, and with notable success.

Advertising helps also to maintain the confidence of a company's stockholders in its management. It stimulates interest in the company throughout the financial world. Well known companies are likely to obtain financing at more advantageous rates, and security analysts are of the opinion that consistent advertising has a favorable influence on stock values.

Assists Expansion

Finally, as more and more companies diversify their products and services, advertising helps them to carry their reputations with them when they enter a new field. A company that is well known throughout *all* industry as a leader in *one* industry, will take its reputation with it when it enters a new area of activity. END

Humanitarian Innovation In Public Relations

The mid-morning kaffee-klatsch is rapidly catching up to the late afternoon cocktail party as a publicity device to introduce a new product or radio show or advertising campaign.

Instead of forcing reporters to stay long after hours, guzzling hard liquor and munching caviar for the sake of a few press releases, some agencies and manufacturers are giving the press an irreproachable reason for ducking out to 10 o'clock coffee. They schedule press parties for that time and supply the appropriate refreshments.

Although this doesn't have the glamour of a cocktail party, it is more economical and less time-consuming, and practically everybody remains sober enough to take the releases. Furthermore, it creates goodwill among the reporters.—*Printers' Ink Editors, Public Relations Idea Book, p. 269.*

AM Labor-Relations Report . . .

Some Thoughts On Safety

Recently I was privileged to sit in on a conference where some of the work being done at the School of Public Health at Harvard by Dr. McFarland and his associates was discussed. Their findings are compellingly thought-provoking and when combined with the studies of other researchers develop an important lesson for American industry. Since America is a country of small businesses—well over 90% have less than one hundred employees—the report that the smaller the company the higher the accident frequency rate is certainly just cause for concern and reason to take a careful look at our own organizations. This is a very practical as well as a humanitarian concern.

There are important industrial relations implications in the whole safety picture. High labor turnover for example is a serious problem in accident prevention. A well advised business organization can seldom spend too much time or money on the selection process. Any mistakes in selection ultimately have to be absorbed into the work place. Careful checking of references and work history of a prospective employee, though often neglected, is of paramount importance. Dr. Tillmann of the University of Western Ontario has made an interesting study of taxi drivers in this connection. His findings can certainly be translated into practical guides in industry. Briefly he found that a man drives as he lives: "protecting a man from his own personality is just as important as protecting him from the hazards of the job." He found that youthful drivers, although scoring high on skill tests during the selection process, actually have the highest accident rate when placed on the job. It was found that the major accidents were caused by the drivers in the twenty to twenty-four year age group and this finding was reduced as age increased.

There is a limit, of course, on the relative value of age. Another study of truck drivers has shown that as age increases vision in low illumination decreases. The obvious conclusion for over the road driving is that a company is asking for trouble if it assigns its older men to the night driving jobs. The problem of seniority could complicate such assignments on night runs and this places the burden on management to interpret the safety factors involved for the good of all concerned. Perhaps the fact that a person's ability to see an accident coming is more important—if this separation can be made—than his emergency reaction after the accident, would be helpful in getting across the relationship between vision and safety.

Lastly, and getting back to the man himself, the above studies found that in trucking as in industry, 60 per cent of the accidents occurred during the first three hours of the work day. It's not fatigue, therefore, that causes accidents, but rather the problems that are brought to the work place. Better industrial relations—understanding workers' problems—should mean improved safety.

—Lowell F. Johnson

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